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Similkameen River Multipurpose Project Feasibility Study
Cultural Resource Reconnaissance
Technical Report

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ABSTRACT AND EXECUTIVE SUMMARY

In spring 1985 the Seattle District, U.S. Army Corps of Engineers carried out cultural resource reconnaissance of selected areas in the proposed Similkameen Multipurpose Project, Similkameen River, Okanogan County, Washington. The study identified 46 cultural resource sites in the study area. Prehistoric sites show a range of types including housepit associations on the Similkameen River and on the southwest shore of Palmer Lake. Fishing sites with Vantage (Cascade) or Frenchman Springs Phase aged components are found along Sinlahekin Creek south of Palmer Lake. There appears to be a Windust Phase (early Holocene) aged component at one site on the northeast shore of Palmer Lake. The probablility of stratified sites is excellent due to the rate of local aeolian and fluvial sedimentation suggested by the frequent presence of (presumably) Mazama tephra sets in colluvial/alluvial fans. The prehistoric assemblages suggest a strong late Vantage Phase efflorescence in the Similkameen drainage. The projectile point inventories contain predominately stemmed specimens in contrast with the predominately side-notched assemblages characteristic of inventories found farther north in the Canadian Okanagan and mid-upper Fraser River drainages. Culturally the area appears to be affiliated with the northern Columbia Basin. Curiously, there are few indications of intensive use of the project area after about 2000 years ago, although a few smaller basal-corner notched and small side notched projectile points are found in local amateur collections. Historic period resources include homesteads and occupations associated with late 19th-early 20th century mining operations. At least one site is suspected to have a mid-19th century Chinese mining occupation. There are also individual Indian allotments. Enloe Dam is on the National Register of Historic Places.

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This report was prepared by Lawr V. Salo. The original fieldwork was carried out by Mr. Salo and Mr. James R. Benson, Evans-Hamilton, Inc. Mr. Benson provided valuable assistance in identifying sites and in developing the preliminary model of the study area's geomorphology as discussed in chapter 2. While in the field we received valuable information from several local persons, and I would like to express my special gratitude to Messrs. Schildgen, Gurney, and L. Allemandi, who kindly showed us their artifact collections and pointed out several sites that we otherwise probably would not have been able to visit.

This report has benefitted from the review and comment of several interested parties. David Rice, Jim Benson, Larry Mann, Noel Gilbrough, and Lynn Larson all have provided constructive comments and suggestions which have contributed substantially to the quality of this report.

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SECTION 1. INTRODUCTION

1.1 Purpose. This report documents the results of bibliographic, field and laboratory studies of cultural resources at the proposed Similkameen River Multipurpose Project near Oroville, Okanogan County, Washington (figure 1-1). The study was undertaken to provide preliminary information about the general kinds and scope of possible effects of the proposed development on the history and prehistory of the local area. This information will be incorporated into the study's feasibility report, which is to be completed sometime in calendar year 1987.

This report is intended as a technical report of findings. It generally identifies the scope of resources present in the study area and sets up a basic framework for evaluating their significance to local and regional prehistory and history, concentrating on changes in local economic adaptation. Both the report of findings and the evaluation framework are intended for later revision as more information becomes available about the ages and other characteristics of the area's occupations.

The report is not an impact assessment for all project alternatives. Alternative design is too fluid to support a detailed impact assessment at this time.

1.2. Scope. The current study is limited to bibliographic and documentary search, informant interview and on-the ground inspection of selected areas judged to have high potential for cultural resources. No attempt was made to develop a sampling strategy to achieve representativeness, as the small size of the project's primary and secondary direct impact areas mandates use of complete inventory for actual impact assessment. The study area also was not examined exhaustively due to limitations in project funding. The study also focuses on prehistoric resources while generally reporting the extent and importance of historic resources.

1.3. Authority. The Reservoir Salvage Act of 1960, as amended by Public Law 93-291, authorizes expenditure of project funds for survey, recovery, analysis, and reporting of important scientific, historical, archaeological, and paleontological data which are being, or may be irreparably lost or destroyed as a result of civil work undertakings on land under U.S. Army Corps of Engineers jurisdiction, including non-Federal lands provided by local interests. The Engineer Regulation promulgated pursuant to this law, ER 1105-2-50, Planning, provides guidance for this investigation and report. Other public laws that deal directly with cultural resources are summarized in appendix A to the cited regulation.

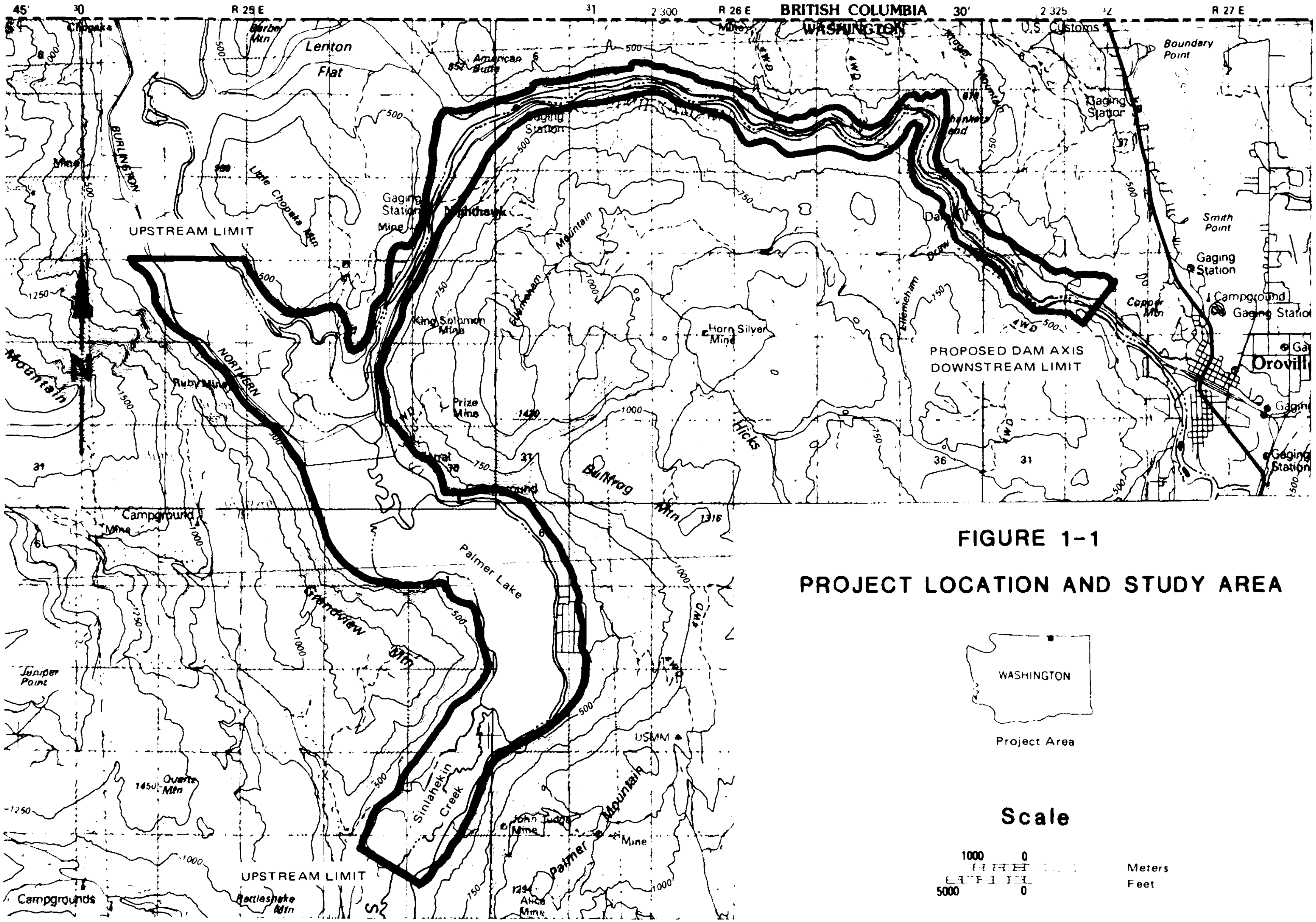


FIGURE 1-1

PROJECT LOCATION AND STUDY AREA

1.4 Project Description. The studied project would involve construction of a high dam on the Similkameen River in the vicinity of Similkameen River Mile 6.6 to achieve flood protection and hydropower benefits. It also might provide fisheries enhancement and irrigation benefits to the local area and region through low flow augmentation. The maximum full pool elevation above the dam for the purposes of this study is considered to be 1155 feet above mean sea level.

Geographically, we have defined the study area as that area between the current water levels and the 400 meter (1312 feet) contour, roughly approximating the maximum possible area that might be affected by the project both through inundation and post-inundation bank erosion and sliding (figure 1-1). The area within this zone that might be occupied by the full pool is approximately 8433 acres in size (Kaumheimer 1984, table 1).

1.5 Distribution. Complete versions of this report disclose locations of cultural resource sites. In accordance with current policy, cultural resource reports that specify locations of archaeological sites will not be made available to the general public to prevent damage to these sites by vandals. Copies of this report with locational data shall not be released for public distribution, including archiving through the Government Printing Office. Complete copies of this report will be distributed to agencies and institutions with an official or professional need for complete information. Specially edited versions will be released to the general public.

SECTION 2. BACKGROUND

2.0 Introduction. General background of the study area has received detailed treatment in several sources; this report will focus on aspects of the project area that are particularly pertinent to the importance of the cultural resources associated with it.

2.1 Environmental Setting.

2.1.1 Physiography. The study area is located along the Similkameen River from near the outfall of the Similkameen River Valley into the Okanogan Trench upstream to near the Canadian Border. The study area also extends south of Palmer Lake up Sinlahekin Creek nearly to the Toats Coulee-Chopaka Lake Road. The region around the study area is part of the Okanogan Highlands physiographic province of north-central Washington (Umpleby 1911). The province is characterized by rolling mountainous highlands with elevations up to 7800 feet and deeply dissected by the valleys of the Okanogan, Similkameen, and Sinlakekin watercourses. Valley floor elevation at Oroville is 918 feet and rises to about 1190 feet in the vicinity of the southern boundary in the Sinlahekin valley.

2.1.2 Hydrology. The Similkameen River crosses the international border flowing southerly as a meandering river in its mile-wide valley. About 6 miles south of the border at River Mile (R.M.) 19.4, the river abruptly turns to the east, loses its meandering character, and cuts through the mountains between the Similkameen and Okanogan Trenches. This easterly flowing segment, the lower Similkameen River, is broken into four distinct reaches. The uppermost reach, between R.M. 19.4 and 15.2, is a relatively gentle (less than 0.5 feet/mile) gradient stream in a broad valley, the walls of which are heavily mantled with glacial deposits. Between R.M. 15.2 and 11.1, the stream flows with a gradually increasing gradient and confined valley bottom with a continuing mantle of glacial deposits, alluvium, and colluvium. Average gradient in this reach is about 3.9 feet per mile. At Shankers Bend (R.M. 11.1), the stream enters a steep-sided rock canyon and descends at a gradient of 27 feet/mile, emerging at R.M. 6.4 from the rock canyon just below the proposed project damsite. Below this reach, the gradient abruptly flattens to 6.2 feet/mile as the stream flows between high glaciofluvial terraces into the Okanogan Valley.

Discharge characteristics for the Similkameen River and Sinlahekin Creek are summarized in Walters (1974). The highest flow recorded on the Similkameen River at Nighthawk occurred on June 1, 1972 (44,800 c.f.s.) (U.S.G.S. 1973). Normal high flows of the Similkameen River occur in June, then drop rapidly. Palmer Lake shows a low-high water surface elevation range of approximately 10 feet, peaking in June at a range from 1051 to 1058 feet above mean sea level.

2.1.3 Climate. The Okanogan River Basin exhibits features of both marine and continental climate. Summers are sunny, warm, and dry, while winters are moderately cold with periods of considerable cloudiness. A strong rain shadow effect is caused by the Cascade Mountain Range immediately to the west. Average annual precipitation in the valley is less than 15 inches, but at higher elevations and on windward slopes, average annual precipitation of up to 50 inches is common. Snow falls over the entire basin between November and April and frequently accumulates on higher mountain slopes to depths of 8 to 10 feet.

Paleoenvironmental and paleoclimatic variability in the last 10,000 years (Holocene) is suggested by several studies of local mountain glacier activity, riverine sedimentation regimes, and pollen deposits in bogs. Recent data are summarized in Chatters (1986); some of his generalizations about the timing of the larger Holocene paleoclimatic changes probably can be extended to the Similkameen basin. In summary, mountain glaciation shows significant readvances from 8500 to about 7500 years ago, 3500 to 2600 years ago, and 650 to 100 years ago. These may correlate with cooler and/or moister climatic intervals. Study of flood plain sediments in the lower Okanogan Trench suggests widespread aggradation around 8,000 years ago; around 4400 to 3600 and 3300 to about 2400 years ago; and from sometime after 2400 years ago to the modern era. Pollen data from a number of regional studies suggest a warming trend to about 4700 years ago, when that trend ended and effective moisture increased significantly.

2.1.4 Vegetation. There has been a detailed, on-the-ground mapping of vegetation in the study area (Kaumheimer 1984). Composition of the local plant communities is strongly influenced by the critical temperature and precipitation gradients. The study area supports a relatively wide range of plant associations due to diversity in year-round water supplies and to rapid elevation increase to the lee of the rain shadow, where increased precipitation on the slopes of the Okanogan Highlands and Okanogan Range of the Cascade Mountains supports both Ponderosa pine/Douglas fir and subalpine forests. Lowland arid zone vegetation has been subject to great change over the last century caused by Euro-American land use practices, but persistent indigenous types generally consist of xerophytic steppe-shrub associations including (1) *Artemisia tridentata*--*Agropyron*, (2) *Artemisia tripartita*--*Festuca*, (3) *Festuca*--*Rosa*, and (4) riparian communities (Franklin and Dyrness, 1973). The study area has a relatively large area of riparian zone that can provide cover and browse for larger game species (especially whitetail deer) (Kaumheimer 1984). The water for sustaining this growth derives mostly from high relief sources. Local plant communities hence could sustain substantial variability in climate without significant change in supported vegetational suites. Isolated minor communities of *Juniperus occidentalis* occur in the vicinity and probably antedate Euro-American settlement. With respect to species of especial economic importance to prehistoric occupants, highly productive patches of bitterroot are reported near Lenton Flats

(Bouchard and Kennedy 1984); chokecherries, elderberries and serviceberries also are abundant in the study area.

2.1.5 Fauna. Diverse habitats including terrestrial plant communities and wetlands such as the Similkameen River, Sinlahekin Creek, Palmer Lake, and numerous marshes and small ponds supported a rich and varied suite of faunal species. The lowlands provide important winter range for a large mule/whitetail deer population, and may have done so prehistorically even though irrigated orchards on former dry land furnishes browse that probably has allowed some increase from former numbers. Before dams, overfishing and siltation drastically reduced anadromous fish populations, the Similkameen River experienced heavy chinook, sockeye, and steelhead runs up to the falls near the present site of Enloe Dam, but anadromous fishes reportedly did not enter the system above the falls (Washington State Department of Fisheries 1938; Bouchard and Kennedy 1984). Seventeen steelhead on redds were counted just above the proposed damsite on April 25, 1985. Large runs of suckers up Sinlahekin Creek were reportedly used by the local Native American populations (Bouchard and Kennedy 1984). The oxbows, channels, and ponds upstream from Nighthawk support populations of waterfowl and shore birds. Freshwater mussels were available locally before recent land use practices caused general mussel population declines and local extinctions. Local sources report shell deposits near the mouth of Palmer Creek (Cohen, personal communication). Prehistorically, elk, bighorn sheep and a few antelope may have occurred in the area and may have been of importance in local human economies. Other economically important species such as muskrat, beaver, mink, and river otter are found in the area. Finally, the Similkameen Trench annually is host to swarms of mosquitoes in late spring, and their presence probably should be accounted in modelling prehistoric useage of the area.

2.2 Geology.

2.2.1 Lithology. The study area is in the central Okanogan Highlands geologic province, in a 10 to 15 mile-wide belt of deformed metamorphic rocks surrounded by Mesozoic intrusives. The granitic Colville batholith is to the the east and multiple intrusive granitic plutons of the Okanogan Range lie to the west. The belt's metamorphic rocks are of the greenschist or amphibolite facies, but retain much of their original lithologic character. Locally, these metamorphics are represented by the Ellemeham, Kobau, and Spectacle Formations. They are locally capped by Tertiary sediments derived from the older foundations. The youngest rocks in the vicinity are minor Tertiary plugs of dacite and related ejecta. Conchoidally fracturing rocks that will support percussive and pressure flaking stoneworking techniques are available locally in both low and higher grades.

2.2.2 Geochronology. Recession of the Pleistocene-aged Okanogan Lobe of Cordilleran glacial ice ending before about 9,000 years ago (Fulton 1969) exposed bedrock and left a thick deposit of glacial drift composed of mostly glacial till and outwash sand and gravel on the floor of the Okanogan and Similkameen trenches up to elevations 1,200 to 1,300 feet above m.s.l. (Salo and Munsell 1977, figure 3). Meltwaters cut deeply into this surface, in the Okanogan Trench leaving a high or "Great Terrace" and many lower terraces cut as the river worked toward its present grade. Volcanic eruptions at Glacier Peak about 13,000 years ago left water-laid ash deposits on the surface of the Great Terrace that provide a terminal date for glaciation in areas in the trench where this terrace is found (Fryxell 1973). The lower (1,000 feet m.s.l.) Osoyoos Terrace heading at Osoyoos Lake was formed in the downcut during a recessional stagnation in the vicinity of Osoyoos, British Columbia and may correlate in age with the end of the Sumas Stade about 11,000 years ago (Easterbrook 1976). In the lower Okanogan Trench, the current view is that three major episodes of flood plain development by postglacial stream action have left an inactive, a moderately active and an active flood plain (Chatters 1986; Fryxell 1973).

The inactive highest flood plain (T2) unaffected by the 1894 and 1948 floods evidently was formed during the early Holocene period (ending before 4,500 years ago) when discharges apparently were greater than those of modern record. Characteristic pumicite (tephra) ejected by the Mount Mazama eruption 6,700 years ago is found in the inactive flood plain at the mouth of the Okanogan River and indicates that the flood plain probably was well formed by at least 8,000 years ago. In both the Similkameen and Okanogan Trenches, the tephra is often found about midway through colluvial fan developments onto this riverine terrace, further indicating the mature age of the terrace.

On the basis of archaeological evidence in the lower Okanogan Valley, the upper, moderately active flood plain (T1) is estimated to be about 4 to 5,000 years old (Chatters 1986; Fryxell 1973). It bears evidence of major periodic fluctuations in basin discharge.

The lowest and most active flood plain (T0) appears to have formed between 3 and 2,000 years ago and shows evidence of a recent increase in runoff and erosion (Chatters 1986).

This chronological developmental sequence generally may hold for the lowest reach of the study area within the influence of the Okanogan River flood plain. However, its extension to the river above R.M. 6.4 is not certain.

There appear to be several late Pleistocene and Holocene-aged landforms along the Similkameen River and in the Palmer Lake-Sinlahekin Creek vicinity. As we have not accomplished detailed geochronological work at them, we cannot establish their exact ages. The picture is further complicated by the construction of Enloe Dam and diversionary structures downstream from Nighthawk, both of which have created ponding effects that have resulted in deposition of a modern lowlying fluvial terrace in their zones of influence. This modern terrace appears to mask older landforms in several places. Nevertheless, we can suggest the following general outline based on our brief field observations and the distribution and characteristics of what appear to be deposits of waterlaid Mazama tephras in alluvial fans in the Similkameen Trench and Similkameen River Valley. We should note that landforms are identified by use of oblique and stereo aerialphotogrammetry in conjunction with U.S.G.S. 15 minute and 7.5 minute maps with contour intervals of 80 feet and 10 meters, respectively. Landform elevations therefore should be considered preliminary and subject to field verification. Figures 2-1 and 2-2 respectively show locations of major descriptive sections and datum points and a schematic of the study area's landform development.

Landform development began in the late Pleistocene when the glacial meltwater-swollen Similkameen River was dumping large amounts of fine sediment into a lake basin (Walker 1974) in what is now the Palmer Lake-Loomis area. The Similkameen River for a significant time drained through this area southward along the Sinlahekin Valley into the Conconully area, then into the Okanogan Trench near Omak. At some time in the late Pleistocene, drainage shifted to the east at Loomis, passing through Horse Springs Coulee at elevation near 1600 feet above mean sea level. With further downcutting below 1600 feet but above 1440 feet, the channel passed through the Spectacle Lake-Whitestone area. There is a distinctive large sloping, fan-like landform on the east side of Palmer Lake with a foot elevation of about 1380 feet and topping at 1510 feet that probably was built into the lake during this stage of its evolution while the present Similkameen River channel was blocked by ice and valley fill below the vicinity of Nighthawk. Soil survey data and well drilling logs suggest that a large block of ice occupied the western half of Palmer Lake at this time (Lenfesty 1980; Walker 1974). At Shankers Bend (R.M. 11), the valley plug appears to have had a surface elevation of between 1400 and 1500 feet as above this level the local surrounding undulating drift topography suggests that stagnant ice wasted in place. However, below this level there is a very dramatic shift in surface appearances to sharply eroded valley walls strongly suggesting rapid fluvial downcutting. Undoubtedly the downcutting started when ice in the trench had downwasted or retreated northward sufficiently and the southern outlet reached harder sediments or bedrock, probably an outcrop of Bullfrog Mountain sharpstone conglomerate about 2 miles east of Loomis (Rinehart and Fox 1972). Probably the recession of ice just before or correlating with development of the Osoyoos Terrace (about 11,000 years ago) opened the Okanogan Trench for outflow and marked the inception of Similkameen Valley downcutting.

During the initial downcutting of the Similkameen Valley plug, water from the Similkameen River flowed southward through Lenton Flat for a brief time (it did not scour out most of the finegrained valley fill sediments as it appears to have done in its main channel west of Lenton Flat) at elevation around 1345 feet. Possibly ice still blocked the

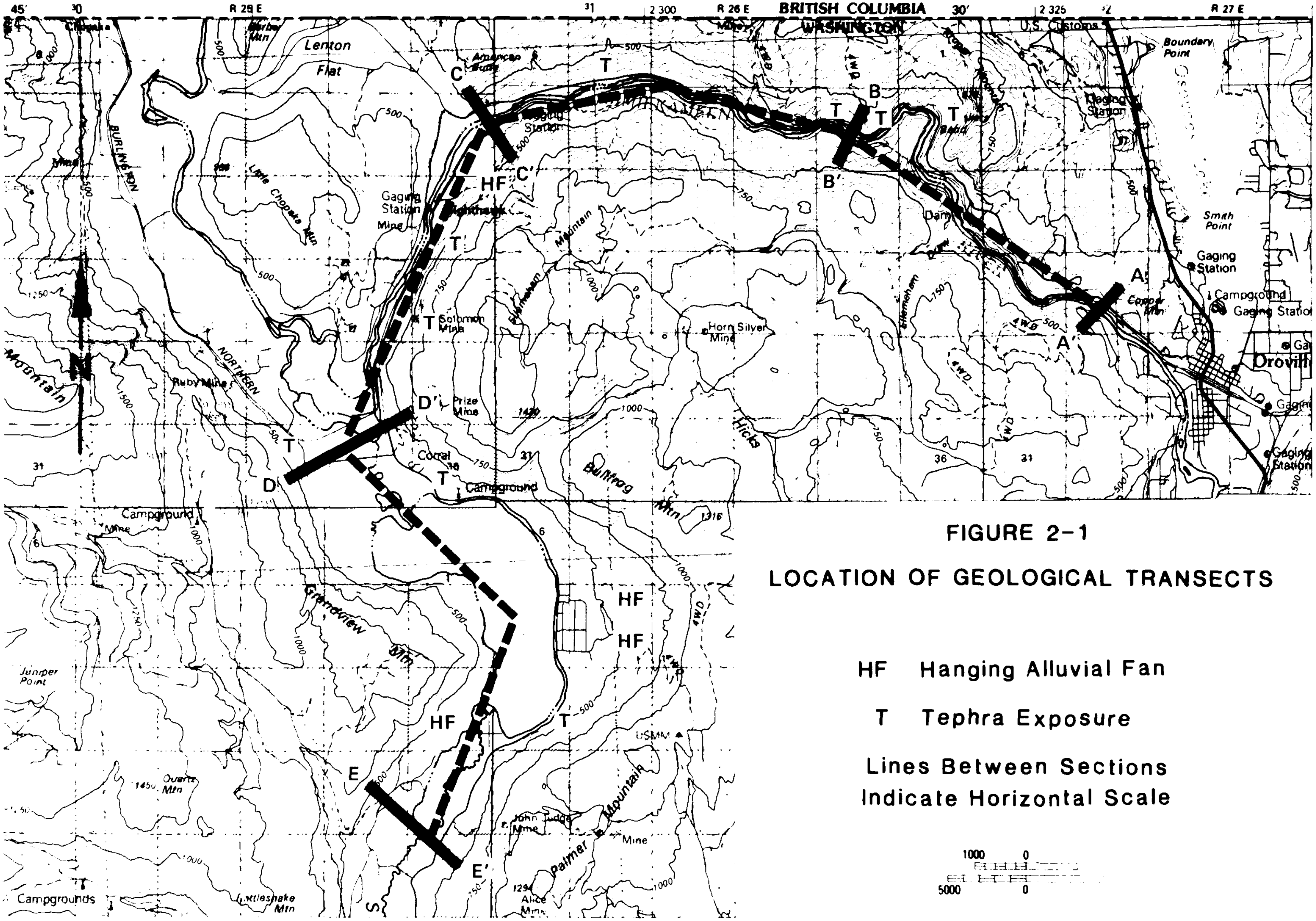


FIGURE 2-1

LOCATION OF GEOLOGICAL TRANSECTS

HF Hanging Alluvial Fan

T Tephra Exposure

Lines Between Sections
Indicate Horizontal Scale

1000 0
5000 0

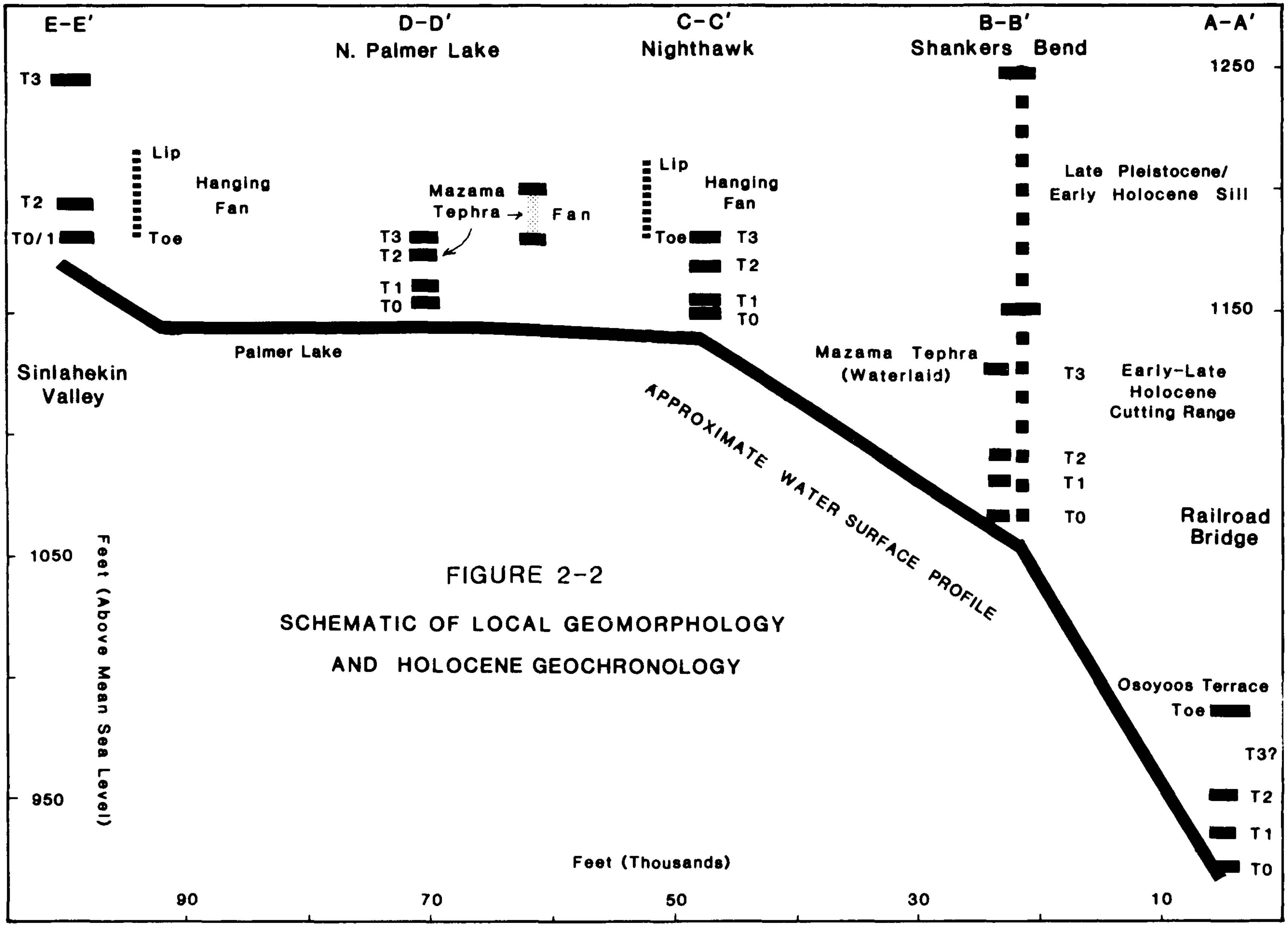


FIGURE 2-2

SCHEMATIC OF LOCAL GEOMORPHOLOGY AND HOLOCENE GEOCHRONOLOGY area occupied by the modern channel west of Little Chopaka Mountain. When the channel bed reached a bedrock "sill" at Shankers Bend at around elevation 1180-1250 feet, the rapid downcutting stalled until either the meltwater flow volume decreased or the rock obstruction was breached at successively lower elevations. A series of well-developed hanging alluvial fans attests to the relatively long duration of the interlude. On the south side of the river opposite the mouth of Lenton Flat, there is a relatively well-preserved fan with a top edge at around 1210 feet and toe at about 1180 feet. Around Palmer Lake, there are remnants of a well-developed hanging fan or lacustrine terrace with a toe of 1180 feet and relatively level top at 1215 feet adjacent to site 45-OK-556; the same landform underlies site 45-OK-558, which occurs in aeolian sediments on the landform surface. We should note that Native American sources maintain that the water in the lake formed by this "dam" backed up to west of Keremeos, B.C. (Bouchard and Kennedy 1984). The 1300 foot contour extends to this area and may mark the old shoreline.

Below this level occur the Holocene landforms. The following series of descriptions is keyed to the different reaches of the river identified in the brief discussion in paragraph 2.1.2, as there seem to be different controlling factors in each reach which have resulted in different elevations and characteristics for terraces of the same age in each reach. All other factors being equal, it is probable that master control of downcutting or landform construction rate is exerted by basin hydrology or climatic variations. The absolute chronology within each model sequence of course remains to be established.

In all reaches there is a low, very active flood channel which appears to represent the modern flood plain. This is designated the T0 landform. Below Enloe dam, the narrow, bedrock controlled canyon and high flow velocities have permitted no signficant development of lowlying terraces or bars with fine sediments until just below the project damsite at the railroad bridge. At about R.M. 6, the T0 appears to occur from roughly bank elevation at 915 feet above mean sea level (hereafter referred to simply as "feet") to around 920 feet (figure 2-1, A-A'). The second, or T1 landform here appears to range from 920 to around 935 feet, followed by a higher landform (T2) from 935 to about 950 feet. Above these is a landform (T3) from 950 to an unknown upper limit. The Osoyoos Terrace occurs above 985 feet.

Above Enloe dam, there is a very recent aggradational terrace on a much older and higher landform. The pre-dam T0 is submerged until about 1 mile above Shankers Bend, at about R.M. 11.3 (figure 2-1, B-B'). Here it occurs from 1058 to about 1065 feet. Above this (on the south bank) is a T1 with an upper surface of about 1080 feet, and there is a narrow T2 with an upper surface about 8 to 10 feet above this at 1088-1090 feet. A thick band of presumably Mazama tephra is found in a shallow trench about 2.5 feet below surface in an abandoned channel on the T3 on the north bank at approximate elevation 1125 feet. This tephra appears to be waterlaid over very fine, possibly slackwater sediments and is topped by similar fine-grained non-volcanic sediments. Aerial photographs show the location of the tephra in a low swale, probably a filled-in channel of the river. The watergap at Shankers Bend probably has controlled stream channel shift at this location.

In the Nighthawk vicinity, at R.M. 16 to 16.3, the developmental sequence has been altered by the Bureau of Reclamation diversion structure (figure 2-1, C-C'). A small and prehistorically insignificant degree of bedrock control may also have been exerted here by a minor outcrop of Similkameen composite plutonic granodiorite on the south side of the river opposite the staging gauge at R.M. 15.3 (Rinehart and Fox 1972); the north side of the river does not appear to offer significant constriction to the channel. Water surface elevation is about 1138 feet; the top of the T0 is about 1148 feet, top of the T1 is about 1153 to 1155 feet, the top of the T2 is about 1168 feet, and the top of the T3 is 1180 feet. A local exposure of a soil high in volcanic ash (Synarep silt loam) is found in this area.

At the north end of Palmer Lake, the highly active floodplain goes from water surface at around 1150 feet to about 1160 feet (figure 2-1, D-D'). This range probably incorporates both the T0 (topping at about 1155 feet) and the T1 (topping at about 1160 feet). There is another landform, possibly a lacustrine terrace, with a top at about 1173 feet (probably the T2), and there appears to be yet another landform above 1180 feet, probably the T3.

Built onto the T2 landform is an alluvial fan about 100 feet north of where the Chopaka road turns north on the west side of the valley. A quarry has revealed a probable stillwater deposit of Mazama tephra, indicating a lakebed elevation of about 1174 feet (see Chapter 3). A deposit of this same ash is found on the southeastern side of Palmer Lake in an alluvial fan cut by the Loomis-Nighthawk road, in the SE quarter of the NE quarter of Section 18, Township 39 North, range 28 East. At this latter location, evidence for stillwater deposition is less clear, but deformation of the fan by sliding may be responsible for the perturbations. There is another exposure of this ash, with a subsequent overlying unidentified tephra, but probably a St. Helens set, possibly Yn (Sarna-Wojcicki, Champion and Davis 1983), on an alluvial fan above site 45-OK-560. The lower ash occurs somewhere between 1180 and 1200 feet, but does not appear to have been laid into still water. The fan is built onto the river without discernable terrace development. Together with the ash in the abandoned channel at R.M. 11.3, these exposures of ash strongly suggest that control of the water surface and hence valley floor elevation in the Palmer Lake area was being exerted primarily by the bedrock at Shanker's Bend until sometime after 6700 years ago.

In the Sinlahekin Valley, the landform sequence seems different (figure 2-1, E-E'). The low valley bottom at R.M. 9 comprises the T0 from elevation 1170 and the T1 to elevation 1180. There is a T2 landform from elevation 1180 to 1195 or so. There is a heavily duned and eroded T3 landform above this elevation. The T2 at this location probably is one of the hanging alluvial fans formed during the initial part of the slowed downcutting at Shanker's Bend during the late Pleistocene or very early Holocene. The T3 almost certainly is late Pleistocene in age, and cultural deposits associated with it probably occur in Holocene fan and dune deposits built onto the older landforms.

2.2.3 Soils. The U.S. Soil Conservation Service has completed mapping of soils in the study area (Lenfesty 1980). While the scale and intent of the mapping leave much to be desired from the particular viewpoint of archaeological requirements, the distribution of the different soil groupings nonetheless is instructive and adds perspective to the foregoing geochronological and geomorphic discussions.

The main soil series in the study area, arranged by parent material, are discussed below. Soils formed in glacial outwash include the Cashmont, Ewall, Haley, and Pogue Series. These soils are predominantly sandy and include soils formed on relatively recent fluvial bars and terraces; a significant number of currently active alluvial fans also are mapped in these series. Soils formed in glaciolacustrine sediments include the Tonasket Series; these soils are predominantly clayey and may include soils formed in early Holocene lake areas as well as in full Pleistocene-aged contexts. Soils derived from glacial till include the Conconully, Lithic Xerochrept, and Nighthawk Series. These soils are clayey and stoney and primarily correlate with exposures of till, but the loamier and less sloping members of the series may correlate with ice-marginal features as well. Soils formed on alluvium include the Boesel, Colville, Okanogan, and Synarep Series; the Cashmere Series includes soils in mixed alluvium and outwash. These soils tend to be silty and are found on lacustrine and riverine terraces and floodplains.

Fron the Canadian border to the northern end of Palmer Lake, soils in the study area characteristically are of the series formed in alluvium and to a lesser extent in outwash. The east side of Palmer Lake is characterized by soils formed in till. The Sinlahekin Valley is associated with soils formed primarily in outwash and to a somewhat lesser extent in alluvium. The R.M. 19.4 to 15.2 reach exhibits soils formed in outwash, alluvium, and glaciolacustrine sediments. In the R.M. 15.2 to 11.1 reach, soils formed from till and to a much less extent, outwash, predominate. Exposures of lithic xerochrepts are particularly abundant in this reach. Till and outwash continue to dominate in the R.M. 11.1-6.4 reach, although the proportion of outwash seems to be higher than in the previous reach. In the lc [illegible]t of this reach below Enloe dam, the higher terraces chiefly show soils of outwash and glaciolacustrine sediments. Finally, the reach below R.M. 6.4 comprises mostly outwash soils, with a small admixture of alluvially and till derived series.

2.3 Ethnohistory. At the time of the initial contacts with Euro-Americans, the Osoyoos or Inkamip and Similkameen bands of interior Salishan-speaking Okanagon Indians occupied the study area. An earlier population of Athapaskan (Tinneh) speakers (Nicola-Similkameen) had occupied the study area, but had intermarried with the dominant

Salishan speakers and had become linguistically and ethnically assimilated long ago (Wyatt 1972; Bouchard and Kennedy 1984). The Salishan hunters and gatherers observed a seasonal subsistence cycle typical of the aboriginal inhabitants of the Columbia Plateau. Winter villages, consisting of elongated tent-shaped, mat-covered houses sheltering several families each, or somewhat smaller semi-subterranean pit houses with timber and earthen roofs, were located along watercourses and were occupied from October to early spring. When highland resources became available and weather conditions permitted, the occupants moved from the villages into better lighted and ventilated temporary shelters. Foraging groups of hunters, fishermen, and root and berry harvesters dispersed to collect various wild foods as they became available. After processing, these foods were returned to the winter villages for storage and later consumption.

Several ethnographers have attempted to reconstruct cultural patterns before 1811, including land use and settlement patterns (e.g., Spier et al. 1938; Hill-Tout 1911; Teit 1930; Turner et al. 1977 and Turner 1980). Known ethnohistorical land uses in the study vicinity include location of winter villages at the confluence of major and minor streams in areas of good winter sunlight; fishing or river mussel gathering at points of maximum availability; use of small river islands and steep hillsides and talus slopes as burial areas or for food storage; fishing at falls and creeks where migratory fish were easily harvestable; and hunting of marmots in talus slopes in spring. Favored root and vegetable gathering areas occurred on hillsides and in draws and canyons. Names and general locations of several winter villages along the eastern and northern shores of Osoyoos Lake and along the Similkameen River near its mouth have been recorded (Teit 1930; Spier ed. 1938). Seattle District has sponsored a survey of ethnohistoric useage and place names of the study area (Bouchard and Kennedy 1984); these data and others gathered by the current investigation are summarized in graphic form (figure 2-3). The most intensive useages are of the Palmer Lake area, the Nighthawk vicinity, and the Enloe-Oroville reach of the Similkameen River. Little use of the river between Enloe and Nighthawk is reported.

The aboriginal subsistence pattern was increasingly affected by arrival of the Euro-Americans. Severe disruption occurred with formation of the Colville Reservation in the 1870's and attendant influx of Native American population from outside the vicinity. Gradually intensifying agriculture and urbanization in the valley interfered with food gathering activities and winter village locations. By 1900, the Southern Okanagon were forced to adopt a more sedentary existence and many were relocated onto the diminished Colville Reservation. However, many continued to exploit certain naturally occurring foods and raw materials until recent times, and seasonal population mobility is still evident. Even aspects of the old religion have survived in some areas.

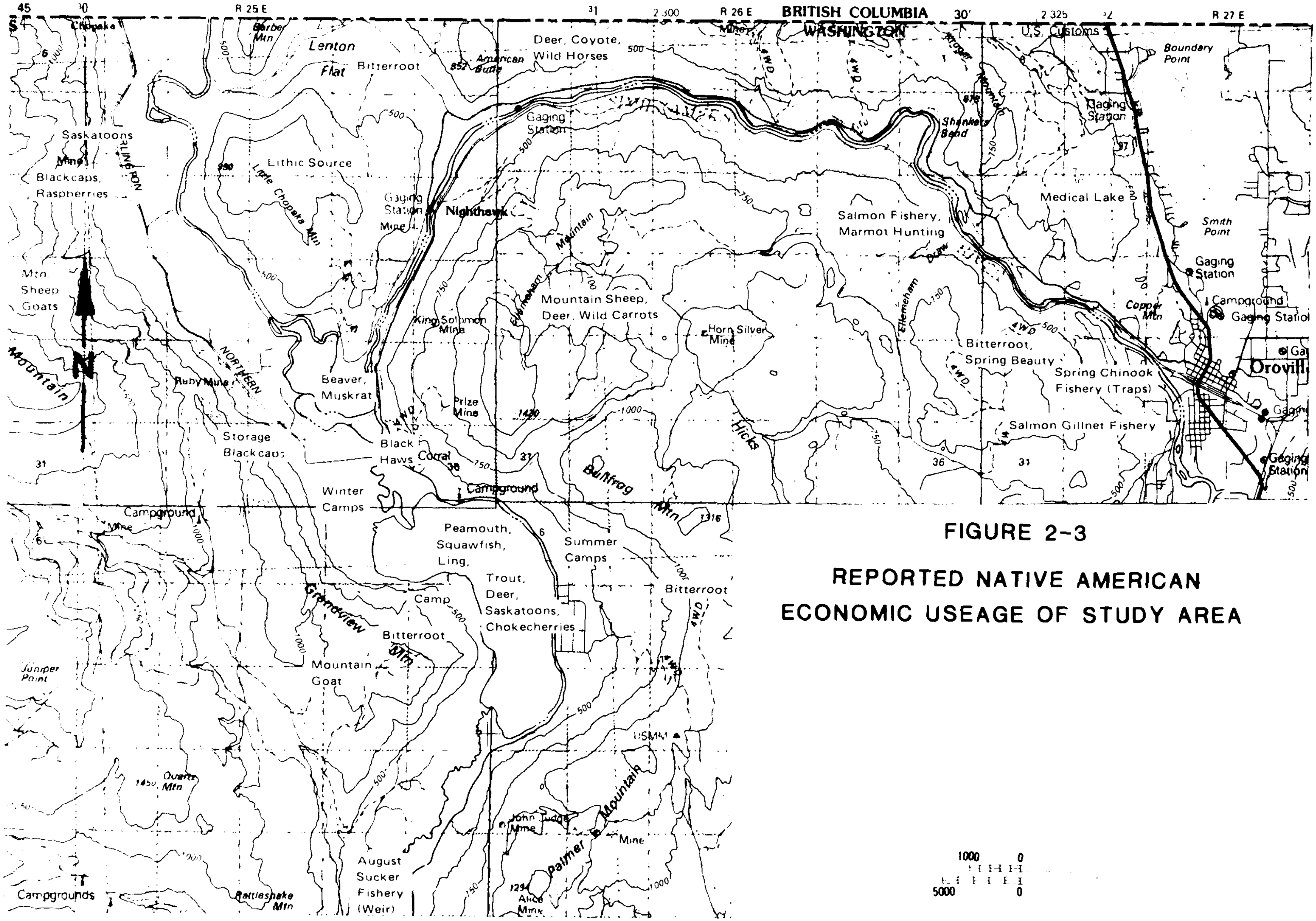


FIGURE 2-3

REPORTED NATIVE AMERICAN ECONOMIC USEAGE OF STUDY AREA

2.4. Archaeology and Prehistory.

2.4.1. Introduction. A substantial body of archaeological background for the northern interior Columbia Plateau has accumulated over the past thirty years. Work in the southern part of the area, in the United States, has been more intense than in Canada, and as a consequence, aspects of the prehistoric record that are most sensitive to archaeological sampling biases and size will reflect this emphasis. In spite of these limitations, we are able to identify the general chronological framework and stylistic characteristics of the successive periods of prehistoric occupation within the region. We also have attained a preliminary understanding of the adaptive strategies practiced within these periods at both the northern and southern ends of the area, but knowledge is particularly well grounded in the southern part of the Okanogan Basin.

2.4.2 Archaeology. Previous archaeological work in the Okanagan Basin has included site inventory, assessment, and intensive excavation level work both in Canada and the United States, including burial relocations. Some of this work has been summarized in regional overviews produced for public agencies (e.g. Lyman 1978; Mierendorf et al 1981; Hartmann et al 1979). Within the study area, work has been limited to inventory. Research contributions supporting the requirements of archaeological investigation in the region recently have included geochronological study of landforms in the Okanogan and Columbia River Valleys; palynological and paleoclimatic studies in British Columbia and Washington; and studies of volcanic ash (tephra) deposits and other geological formations in both Canada and the United States. Finally, a substantial body of knowledge from the Fraser River and its subbasins forms a comparative base for inquiry into many aspects of Okanogan Basin prehistory (e.g. Sanger 1963, 1966, 1967, 1968a and b, 1969, and 1970; Wyatt 1971 and 1972).

The inventory of prehistoric sites in Okanogan County in the state of Washington alone now stands at over 450. The Canadian inventory for a similar-sized area in the Okanagan Basin appears in excess of 180. In generating this combined inventory, the first archaeological reconnaissance near the study area was conducted by Caldwell in the Okanagan and Similkameen Valleys in British Columbia in 1954 and recorded over 100 archaeological sites, 34 of them in the Similkameen Basin (Caldwell 1954). Many years later, a brief reconnaissance of the Okanogan Valley from Brewster to Oroville identified 18 prehistoric sites in the Tonasket-Oroville-Palmer Lake vicinity (Grabert 1966). In 1967, Grabert conducted a survey in the Okanagan Valley in Canada, recording 29 archaeological sites (Grabert 1968). Further inventory of the Okanagan Lakes and Similkameen River area in 1974-5 recorded 73 more sites, including several in the Similkameen Basin (Copp 1975 and 1977). Inventory in the United States' portion of the basin has been intense since the early 1970's, recording the greater part of the current site inventory. A few sites near or within the project have been identified in the course of cultural resource management by the U.S. Bureau of Reclamation (Honey, Draper and Snyder 1979; Snyder and

Honey 1980; Hartmann and Stephenson 1981), the U.S. Bureau of Land Management (Randolph n.d.), the U.S. Army Corps of Engineers (Salo and Munsell 1977), the Washington State Department of Transportation (Eller 1980), and the State Parks Department (Benson 1979).

There have been numerous minor test excavations at sites in the northern end of the Okanogan basin. In the late 1960's, Grabert conducted test excavations at six archaeological sites in Canada (DiQw2, EbQu11, EbQr1, EcQt2, EcQt4, and EcQv4) and two sites (45-OK-29 and 45-OK-145) in Washington (1974). His study characterized 9 components, including two dated by a total of 3 radiocarbon age determinations. On the east shore of Osoyoos Lake in B.C., Roberts conducted test excavations in late prehistoric and protohistoric period housepits (Copp 1975). In 1975, Copp excavated a late prehistoric open camp (DhQv48) at the south end of Okanagan Lake, producing information for use in intrasite spatial analysis of a single late prehistoric component as yet undated by radiocarbon determination (Copp 1977). Several sites near Oroville were tested in 1977 to analyze impacts of an urban levee construction project, with largely negative results (Lothson 1977).

There have been at least two professionally conducted burial relocations in the northern basin. In 1985, two late prehistoric burials were removed from a road cut near Tonasket, Washington (Chatters 1985). In 1986, several fragmentary inhumations were recovered from a pipeline excavation along the Okanogan River east of Oroville, Washington (Chatters 1986a).

In spite of these data retrieval oriented studies, knowledge of the northern part of the basin is inhibited compared to the southern basin, where major hydroelectric development projects along the Columbia River have resulted in testing at over 100 sites and extensive excavation at more than 40 sites dating from roughly 7000 years ago to less than 100 years ago (Osborne, Crabtree, and Bryan 1952; Grabert 1968; Carlevato et al 1982; Lyman 1976; Welch 1983; Bryant 1978; Chatters 1984 a and b; Chatters 1986b; Jermann 1985; Campbell ed. 1985; Benson n.d.). A long-term data recovery program at Kettle Falls also comprises a major comparative source for Okanogan prehistory (Chance 1967, 1970, 1973; Chance and Chance 1977, 1979, 1982, 1985; Chance, Chance and Fagan 1977).

The comparative base for the northern basin is widened somewhat if the work of Sanger and Wyatt in the Fraser River basin is considered. In the late 1960's, Sanger summarized a series of archaeological projects that had been carried out in the previous 15 years along the Fraser and Thompson Rivers, about 100 miles northwest of the the study area. The summary was based on excavated assemblages from about 20 components, 5 of them aged by a total of 12 different radiocarbon determinations. Two sites near the mouth of the Fraser Canyon excavated earlier by Borden provided comparative data.

About this same time, Wyatt pursued investigations in the Nicola River basin, an area without anadromous salmonids that adjoins the upper reaches of the Similkameen basin. He identified about 50 sites, mostly housepit sites with single components. About 21 sites were tested and 10 were excavated by 1972; most of them were occupied primarily during the late prehistoric period (Wyatt 1971, 1972).

2.4.3. Prehistory. Using this regional archaeological database, several conclusions may be drawn about regional prehistory. Culture historical sequences for the region have been constructed; ethnic identity problems have been investigated; and changes in adaptive strategies have been tentatively identified.

2.4.3.1 Culture Historical Sequences. In the north, the only locally derived sequence is that for the Fraser River developed by Sanger and Borden. Grabert and his successors have extrapolated to the northern Okanogan Basin from the Wells Reservoir, and while their sequence is a useful approximation, its sensitivity to local cultural variability is unknown.

Fraser River. Sanger proposed a roughly tripartite chronology consisting of Early (four components dated from 7,600 to 5,000 years ago); Middle (5 components dated from 5,000 to 2,000 years ago) and Late Periods (11 components dating within the last 2,000 years). He did not develop a projectile point typology/chronology. For comparative purposes, I should emphasise that the dates shown are solar years, not radiocarbon years (dendrocorrected after Klein et al 1982).

The Early Period assemblages show a microblade/microcore technology which does not appear to be associated with occupations at housepit sites. Projectile points are large lanceolate forms, triangular and leaf-shaped, including some side and basal notched forms. The specimens tend to resemble northern Plains more than southern Columbia Plateau examples (Plano versus Windust/Cascade), although Cascade-like assemblages certainly are present. Antler wedges and rodent incisor woodworking tools occur. Fish remains that are presumed to be salmonid are found at the Milliken site (8-9,000 years ago) and with at least one component about 7,600 years ago. No house forms were identified.

The Middle Period assemblages continue the microblade/core technology, especially strongly expressed in the early part of the period from 5,000 to 3,500 years ago. This technology is not unequivocally associated with house sites although excavation samples often were small and may have failed to reveal buried houses. Projectile points mainly are expanding-stemmed and lanceolate forms with indented and notched bases that resemble northern Plains forms (Hanna-Duncan-McKean-Pelican Lake) more closely than southern Plateau forms, especially in the earlier part of the period. Later Middle Period (after 3,500 years ago) basally-notched and corner-notched forms bear much stronger resemblance to Southern Plateau forms. The later Middle Period also has a woodworking kit of wedges, nephrite adzes, beaver incisor chisels, and pecked mauls. Fish remains occur throughout the period. Houses (two meter deep subterranean) appear in the later Middle Period.

Late Period assemblages have no microblade technology. Small side-notched projectile points (arrow points, presumably) are the characteristic forms, and the woodworking kit of the late Middle Period is continued. Fish remains continue. Housepits are more circular and shallower.

Many of Sanger's interpretations of the meaning of the sequences have been overshadowed by data from the massive cultural resource management projects since the mid-1960's but several observations appear to have weathered well: the decline of the microblade technology by about 2,500 years ago, the apparent northern/eastern (Plains) cultural affinities of the Fraser River region until the later Middle Period, and the "northwesternization" of the area in the last 2,000 years.

Nicola Valley. In line with the author's research interest in Nicola tribal archaeological/ethnic identity, the Nicola Valley studies were strongly focussed on Late Period occupations. The concentration is evident in the application of inventory, testing, and data recovery to sites with visible surface depressions that were taken to indicate storage pits and houses. Wyatt did not construct a local chronology, but referred his assemblages instead to Fraser Canyon sequences. Although many of the assemblages are associated with the Kamloops Phase, there are considerable numbers of projectile point forms indicating earlier occupation at several sites. Reexamination of Wyatt's published (1972) data using the Chief Joseph Dam project's projectile point chronology suggest that a full sequence of mid-to-late Holocene aged occupations is present in the assemblages, with varying degrees of mixing of assemblages. The earliest occupation on typological grounds falls within the Kartar (or late Vantage) Phase (more than 6000-4000 years ago) or Sanger's Early Period and is characterized by Cascade A and C projectile points, presence of edge-battered cobbles, heavy use of bone tools, and frequent use of unifacially modified stone tools. Microblades and microblade cores, although not unequivocally associated with Kartar-aged assemblages at sites EbEa:1 and EbRa:2, probably occur in this phase. No houses are known from this phase, but this lack almost certainly stems from sampling bias. Three occupation assemblages could be assigned in part or entirely to this phase. There are 3 representatives of the Hudnut Phase, or Middle Period. This phase is marked by medium-sized basally notched projectile points and contracting-stemmed points, although the former tend to prevail in keeping with the Fraser River cultural affinities of the area. There is a good radiocarbon date from a housepit floor containing a late assemblage within the phase at site EbRc:3. Finally, there are 8 Coyote Creek Phase (2000 to 100 years ago) or Late Period assemblages, including 5 or 6 within the Fraser River Kamloops Phase (900-150 years ago) marked by small side-notched projectile points and presence of semi-subterranean and mat lodge remains. Occupations of this phase contain numerous storage pits with aspen bark rolls and fish remains (vertebrae) and also show stone-boiling features.

Upper Okanogan Valley. Compared with the Fraser and Nicola River basins, the upper Okanogan Valley appears to have greater affiliations with the southern Plateau throughout all time periods, at least in projectile point forms. As in the Fraser Valley, microblade technology is found and dated from around 7000 to around 3000 solar years ago. Grabert was able to relate the components recovered in his excavations to the sequence developed for Lake Pateros on the Columbia River, and projectile point types were similar. However, side-notched triangular point forms were more numerous in the north and small stemmed and corner-notched forms tended to be more frequent in southern assemblages. His cultural phases, with ages in solar years, are: Okanogan (??? to around 6,000 years ago); Indian Dan (around 6,000 to around 3,000 years ago); Chiliwist (around 3,000 to around 900 years ago) and Cassimer Bar (around 900 to around 150 years ago) (Grabert 1974). By far the largest number of typologically and/or radiocarbon dated components fell into the earlier Okanogan/Indian Dan Phases (6 versus 2, with 1 undated).

Columbia River. This work recently has been expanded by Chatters (1986). His investigations concentrate on evolution of adaptive strategy, but he does use data from his 25 dated occupations together with some information from the Chief Joseph Dam Cultural Resources project to update the 1968 chronology. The revised phase dating, converted from radiocarbon to solar years (Klein et al 1982), is: Okanogan (10,000 to around 7,000 years ago); Indian Dan (5000 to around 4000 years ago); Chiliwist (3600 to 2300 years ago); and Cassimer Bar (900 years ago to around 150 years ago). He also identifies several cultural periods, which he uses in his analysis of adaptive strategies; these are, with age ranges again converted from radiocarbon to solar years (Klein et al 1982): Period 1 (7800 to 5500 years ago) with 9 members; Period 2 (4350 to 3800 years ago) with 6 members; Period 3 (3300 to 2200 years ago) with 5 members; and Period 4 (900 to 150 years ago) with 3 members. The scarcity of later period occupations was attributed to sample bias and research focus.

The Chief Joseph Dam project developed a three-part chronology aimed at identifying and studying change in settlement patterns and adaptive strategies for occupations that were present at the project (Lohse 1985). Brief assemblage descriptions of the periods/phases, with ages in solar years, follow. The early Kartar (about 6500 to 4000 years ago) Phase roughly corresponds to the Indian Dan and Okanogan Phases. Artifact assemblages contain a high proportion of multipurpose cobble tools; microblade technology is fairly common at nonresidential sites; and emphasis on cryptocrystalline silicates early in the phase declines, fine-grained volcanics such as basalt playing a larger role toward the end of the phase. Projectile points associated with the phase include large stemmed forms and distinctive leaf-shaped lanceolates; the later part of the phase includes large side-notched forms. There is a well-developed bone tool industry, including fishing implements such as barbed harpoons and woodworking items such as antler wedges and adzes. The succeeding Hudnut Phase (4,000 to 2000 years ago) represents a very large occupation of the area. Artifact assemblages associated with this phase include a variety of lanceolate and stemmed projectile points; late in the phase a series of large basal- and corner-notched forms of overall triangular outline appears. Cobble tool useage declines; use of volcanics such as basalt peaks about 3000 years ago, then falls off sharply. Microblade technology is present until about 3000 years ago. The Coyote Creek Phase (2,000 to 100 years ago) artifact assemblages include an early series of delicate stemmed and expanding stemmed (barbed) projectile points. Late in the phase small sidenotched points appear. Nearly all smaller chipped stone artifacts are of cryptocrystalline silicates such as chalcedony and jasper. Cobble tools are fairly infrequent. Ground and polished nephrite adzes appear in the inventory. There is a proliferation in fishing implements, including valved harpoons. In addition to the development of formal phase descriptions, an extensive projectile point typology and stylistic chronology also was formulated (Lohse 1985).

Finally, Chance's work at Kettle Falls has evolved an occupation sequence, but without developing a stylistic chronology (Chance and Chance 1985). The occupations are divided into 7 major periods; except for the oldest period, all assignments are based on dendrocorrected radiocarbon dates, ages expressed in solar years. The Shonitkwu period, with 2 occupation assemblages, on the basis of stratigraphy and stylistic similarities is estimated to range from about 9600 to 8800 years ago; it corresponds with the lower Snake River Windust Phase (Rice 1972). Microblade technology is present. The Slawntehus period (7300 to 5600 years ago) has 27 occupation assemblages (including surface sites), and appears to correspond with the early Cascade Phase and very early Kartar Phase assemblages; microblade technology also is present in this period. The Ksunku period (4800 to 3600 years ago) was a major constituent of the Kettle Falls assemblages (3 representatives). As in the two previous periods, microblade technology is present. The Skitak period (3600 to 2800 years ago) corresponds to the Hudnut and Frenchman Springs Phase and has 3 representatives. Microblade tecnology continues in this period. The Takumakst period from about 2800 to 1700 years ago (5 representatives) roughly corresponds with the late Hudnut/Frenchman Springs Phases. Microblade technology no longer is present. The Sinaikst period (1700 to 600 years ago) corresponds in many respects with the Coyote Creek and Harder Phases, and is represented by 6 large assemblages. The final prehistoric period, Shwayip (600 to 200 years ago) (7 representatives) is analogous to the ethnographically described culture of the area; it is roughly correspondent to the Numipu (Leonhardy and Rice 1970) and Kamloops Phases.

2.4.3.2 Ethnic Identities. The ethnic identity problem has been of concern to several investigators in the region. Wyatt in particular was intrigued by the presence of an Athabaskan speaking cultural group in the midst of Salishan-speakers, and attempted to identify archaeological affiliates of the different ethnic groups in an attempt to trace the history of their presence. He surmised that they might have represented a group more adapted to hunting than to fishing, as their territory seems to have occurred in areas without large anadromous fisheries (Wyatt 1971). There also has been speculation that the local Athabaskan-speaking populations may have represented a relict population of a much more widely distributed, earlier adapatation, as indicated by the distribution of certain scraper forms and microblades (Munsell, p.c.). Unfortunately, Wyatt was unable to identify any attributes in his study population that could be tied to ethnographically identified Athabaskan characteristic implements.

In any case, the origin of the cultural pattern identified during the historic era, namely, the spread of intensive fishing techniques associated with the Salishan-speaking peoples of the Coast and Interior Plateaus, also has been of longstanding research interest. The question of establishment of northern-southern Plateau cultural boundaries provided a major focus of inquiry until the early 1970's. Unfortunately, there has never been a systematic and rigorous investigation to demonstrate the nature of the archaeological differences and similarities, although the stylistic evidence certainly suggests that identifiable differences are present in many periods.

2.4.3.3 Adaptive Strategies. Most researchers in the past thirty years have speculated about the nature of local economic adaptations in the prehistoric past. However, the data and methodology to investigate them formally and systematically were not available until the large archaeological data recovery projects associated with Federal hydropower developments had been completed in the mid-1980's. Probably the most comprehensive study on this topic is that carried out at the Chief Joseph Dam project (Campbell ed. 1985), although Chatters (1986) has investigated along similar lines at the Wells Hydroelectric Project. The adaptive sequence from the Chief Joseph Dam project is summarized in the following paragraphs (Salo 1986).

There was little evidence of occupation before about 6500 years ago. Data in the Okanogan region for Windust Phase-aged assemblages are scarce, and limited to a series of occupations at Kettle Falls and the Wells Hydroelectric Project (Chance and Chance 1985; Chatters 1986b). The earliest two, in the Shonitkwu period, are undated but probably are around 9000 years old. There is fairly good representation of the later part of the pre-Kartar period in the earlier part of the Slawntehus period. The Wells Hydroelectric project also has five well-dated assemblages in the 1500 years preceding the Kartar Phase (Chatters 1986b). Generally, the period is characterized by high residential mobility and generalized faunal exploitation. Overwintering probably was based on a strategem of light use of stored foods heavily supplemented by hunting and fishing; shellfish exploitation probably was a major back-up component of this survival stratagem. Populations probably were small and highly dispersed, relatively strongly limited by the carrying capacity of the environment at minimum productivity in annual and decade-length cycles. Heavy use of local fisheries probably occurred at all seasons of availability, as suggested by the presence of occupations from this time period near supposedly good fishing sites and at major regional sites such as Kettle Falls and Long Narrows Rapids on the lower mid-Columbia River. Early assemblages in the Okanogan (and probably the Nicola) River drainage seem to occur in the vicinity of smaller lakes, again suggesting a heavy reliance on fisheries for subsistence. No residential structures have been found in association with assemblages of this time period, probably due to difficulty in discerning their remains during excavation.

In the Kartar Phase, more detail about adaptive strategies begins to emerge. Early in the phase, from about 6500 years ago to around 5,000 years ago, the adaptive system emphasized frequent moves of central bases, inferred from the moderate numbers of small, sparse sites widely distributed throughout the area. Subsistence generally was similar to that of the preceding Windust or Okanogan Phase (Chatters 1986b). Later in the phase (5000 to 4000 years ago), the adaptive system apparently changed, becoming strongly central-base oriented. Central bases seem to have been located near premium winter range where overwintering was sustained by preying on yarded-up ungulates, primarily deer. Late Kartar Phase sites tend to be of two kinds: fairly lightly used central bases characterized by housepits of at least two kinds and large numbers of extremely small sparse sites. Throughout the phase, populations appear to have concentrated their activities along the larger rivers. Faunal remains in their sites are very diverse in kind, suggesting what is known as an encounter statagem for hunting.

During the Hudnut phase (4000 to 2000 years ago), the number of sites rises dramatically, and sites also appear to become more diverse in kind. Use of upland areas is more frequent. The adaptive system appears to become more strongly logistical, as suggested by the greater number of central bases, storage pits, and lessening diversity of faunal species associated with the sites. However, winter residential bases appear to have been moved fairly frequently, suggesting that overwintering still depended fairly strongly on use of local game populations. Fishing seems to have become a greater focus of economic interest. Populations actually may have increased during this time and seem to have concentrated in the northern part of the Columbia Plateau. The number of simultaneously occupied communities appears to have doubled. Late in the phase (from about 2500 to 2000 years ago) there is a distinct drop in the number of sites, perhaps as a result of population concentration in larger central residential bases rather than a decline in total population.

When the following Coyote Creek Phase began around 2000 years ago, there was a distinct cultural change. Larger villages appeared and seem to have been occupied for a long time. An early decline in the number of sites is followed closely by a considerable expansion. There is a relatively even balance of base sites, field camps, and locations/stations, indicating a strongly logistical adaptive system.

Evidence for storage is present in the form of pits and faunal remains. Fishing technology is elaborated, and combined with storage technology, probably explains the formation of villages. The phase also saw the introduction of bow and arrow-based hunting methods, which further increased the efficiency of the economic system. There seems to have been some change in the way upland areas were used in this period; fewer rock shelters show use as habitation sites, but rather seem to have more frequently used as storage caches. There are proportionately more open air campsites with evidence of constructed shelters than in the Hudnut Phase. Overall, upland use is poorly understood for this time period, as for all others. The Coyote Creek Phase seems to be the beginning of the time in which the local peoples established the cultural system that was typical of the area when Euro-americans first arrived in the early 1800's.

Large changes in the adaptive system occurred with the introduction of the horse in the 1700's and later when Euroamericans began colonization, but these changes are not well documented archaeologically. Mobility increased dramatically, changing the shelter form, political organization, and dependence on trade for subsistence. The mobility also facilitated the spread of new contagious diseases, resulting in large-scale depopulation and further changes to the adaptive systems.

2.5 History. Arrival of the first known Euro-American explorers in the Okanogan Valley in 1811 (David Thompson) marked the beginning of local history and a long period of rapid cultural change. Combined with intensifying outside investment of capital, the .w modes of transportation introduced by the Euro-Americans were key elements in transforming the local economies and appear to have had profound effects on the political relationship between the old and new ethnic groups.

2.5.1 Fur Trade and Exploration. The historically documented adjustments occurred in several major stages before reaching the contemporary condition. From 1811 to about 1860, outside capital supported the initial exploration by David Thompson (1811) and fur trading ventures based at the American Fur Company's (later North West Company, then Hudson's Bay Company) Fort Okanogan on the Columbia River. Capital from governmental, military, and religious organizations sponsored explorations by the Wilkes (1841), McLellan (1853), and DeSmet (1842) parties. During this era, the major modes of long distance transportation included the canoe and the horse, which was rapidly adopted by the local Indian populations. Incursion of large populations of Euro-Americans did not yet occur. The successful fur business depended upon trade with local Native American trappers to supply quantities of low-priced furs. During this period, relations between the Indians and Euro-Americans were symbiotic as it was to the distinct advantage of the fur traders not to interfere with basic operation of the native societies that were the main producers of the company's income. Several effects of this economy on the native cultures have been described (Grabert 1973), but the Euro-Americans did not yet directly disrupt established land use practices by usurping the fertile river valleys for agriculture. However, gradual exhaustion of fur resources and a series of plagues and consequent Native American population declines, style changes, and political events contributed to a great diminishment of the fur trade, and by 1860, the Hudson's Bay Company virtually had ceased operations in the Okanogan region.

2.5.2 Placer Gold Mining and Herding Economy. In 1858, placer gold was found in the Fraser River in British Columbia. Periodically from 1858 to the 1880's, swarms of miners were drawn to the Okanogan area in search of placer gold deposits and a passage to the comfortable life. The placer mining era ushered in great changes in the Okanogan Valley and the Osoyoos-Oroville vicinity. Large groups of miners formed temporary settlements in places with convenient access to supplies and the gold fields. One such encampment near the mouth of the Similkameen River following a gold strike at Shanker's Bend in 1859 was called "Okinagon City" and in 1860 had a population of 3,000 (Brown 1968). Not all the adventurers were Euro-Americans; in 1861, 150 Chinese laborers worked placer deposits along the Similkameen River, one of the earliest occurrences of Chinese mining in the state.

The mining camps meant that a small local market for agricultural products existed. The demand was sufficient to stimulate the growth of cattle ranching based on exploitation of the rich bunchgrass growing in the area. Cattle drives between mining camps were common from 1858 to 1870 in the Okanogan Valley. Increasing demands in the cities west of the Cascades combined with necessity of supplying the mining camps led to expansion of trade and commerce in general. Outside capital was attracted to gold mining and fostered other economic developments. In the 1870's, true colonists began to arrive, drawn by stabilizing economic conditions and fertile soil. They had been preceeded in the Oroville area in 1858 by Hiram F. Smith (called "Okanagan" Smith), who began serious farming with a 24-acre orchard and herds of alfalfa-fed purebred cattle. Farming brought roads in the mid-1870's, churches and schools in the 1880's, a county government in 1888, depletion of native fauna and grasslands, and drastic declines in anadromous fish runs.

Although relations between ethnic groups had been peaceful during the fur trading era, they deteriorated throughout the placer mining period while the Euro-American culture emerged in dominance and economic importance. In 1858, the great influx of aliens into eastern Washington greatly alarmed the Native American inhabitants of the region and resulted in a war that saw the military defeat of several Indian forces after initial victories over the poorly prepared United States expeditions. The Euro-American subsistence base in direct conflict with the Native American way of life eventually led to formation of the Colville and Moses Reservations in the United States and large-scale removal of native peoples from the study area.

2.5.3 Hard Rock Mining and Intensive Agriculture. Improvements in trans-portation brought about by capital investment spurred development of hard rock mining and agriculture throughout the period 1880 to 1910.

The regime of increasingly mechanized transportation beginning with stagecoaches, advancing to steamboats during high water, and culminating in the advent of railroads from 1900 to 1910 meant that machinery could be brought in to exploit mineral and soil deposits that required concentrated efforts. The greater local populations needed for industrial expansion led to minor agricultural development, but the real boom did not come until the railroads provided reliable access to mass markets.

Urban centers serving the mining and agricultural industries grew apace during the early modern era. The town of Oro, later Oroville, started as a small mining camp in 1873 at the confluence of the Okanogan and Similkameen Rivers and was incorporated and platted in 1892. It grew rapidly until 1907, when the railroad terminus caused the center of town to be moved away from the river. Throughout this era the Similkameen mining district was one of the most important in the state.

The town of Nighthawk was founded in the late 1890's in response to the development of the Nighthawk Mine in the Similkameen mining district. This mine produced sizeable quantities of lead, silver and zinc. The townsite originally encompassed about 160 acres and grew to include a post office, stable, general store, saloon, and assay office.

By 1910, the study area essentially was in the modern era of rapid and efficient mechanized transportation. It was served by a railroad branch line from Oroville, constructed before 1910 (U.S.B.L.M. n.d.). Since 1910, surfaced roads have been added gradually along with the automobile, and the forest products and fruit industries have replaced the mining and cattle economy as the main source of local income. Irrigated agriculture gradually became the dominant local source of income. An early development of irrigation along the Similkameen River began in 1915 (Honey, Draper and Snyder 1979). The overwhelmingly Euro-American population decreased during the Depression years, but has rebounded gradually to about 1,600 (1970 level). Throughout the next decade, gradual economic growth is forecast.

SECTION 3. STUDY PROCEDURES AND RESULTS

3.1 Procedures.

3.1.1 Bibliographic Search. Preliminary investigation entailed coordination with appropriate cultural resource authorities (appendix B). A bibliographic search was held to determine if significant cultural resources might be present in the project area (see appendix A for a general bibliography).

3.1.2 Field Investigation.

Informant Interviews. Interviews with all landowners and local persons who were familiar with the cultural resources provided valuable information and led to documentation of several sites (appendix B).

Pedestrian Inspections. As it appeared likely that significant cultural resources might be present in the study area, field reconnaissance was undertaken by archaeologists from Seattle District during late April and June 1985. The investigation entailed visual inspection of surface exposures within the area to be affected by the project and in the general vicinity. Attention was also devoted to places, upstream and downstream from the project that could experience erosional damage as a result of increased water surface elevations or flow velocity due to riverflow modification. Due to funding limitations, the investigation was constrained to areas judged on the basis of previous regional experience to be most likely to exhibit significant cultural resources within the shortest time. For this reason, hard-to-reach and heavily vegetated flatlands and sloughs along the Similkameen River above Palmer Creek received scant attention even though they undoubtedly have many undiscovered sites if findings in the Oroville vicinity may be extrapolated to this area (Salo and Munsell 1977). We also avoided areas with complex ownership, to avoid having to spend the large amount of time usually required in seeking access to such lands; such areas included the town of Nighthawk and the east shore of Palmer Lake. We also avoided severely disturbed terrain as much as possible, excluding most of the north bank of the Similkameen River from Shankers Bend to the diversionary structure downstream from Nighthawk. There undoubtedly are unrecorded sites within this area, but quality of most of them is likely to be low in view of the intense construction of irrigation canals, roads, and placers in this narrow canyon. The low east shore of Palmer Lake likewise falls into this category, as it has undergone extensive terracing for road and residential construction. Finally, we did not examine the south bank of the river below Nighthawk as it was not possible to gain access to the area without a small, easily launched boat.

Surface examination involved walking along riverbanks and surfaces exposed by plowing, construction, and other activities. Where areas were sufficiently large, the transects were spaced at intervals of approximately 10 meters to permit each observer adequate visual coverage of the transect area. Both horizontal (cultivated fields, cow trails, roadbeds, etc.) and vertical (irrigation and drainage ditches, riverbanks, etc.) exposures were examined. Geological observations were recorded at several locations. As the objectives of the reconnaissance did not require systematic collection of artifact assemblages, items were recovered only if they were subject to loss and if they would assist in confirmation and characterization of sites. No subsurface explorations were conducted.

In this investigation, if a topographic unit exhibited artifact concentrations separated by voids, appreciable water (streams, rivers), or landforms (rock outcroppings, talus fields, etc.), each concentration was defined as a site. All sites and survey transects were recorded in the field on two documents. General descriptions of sites were recorded on cultural resources record forms (appendix E); locations of sites or visual inspection transects were recorded on recent aerial photographs. Site locations later were transferred to U.S.G.S. 7.5 and 15 minute contour maps. Information pertaining to possible field observational biases also was noted carefully. The locations of sites in the study area are shown on figure 3-1. Locational data were derived from latitude and longitude coordinates at the relative center of the site. All vertical locations are with respect to mean sea level. In addition to point coordination, sites were located to the nearest 1/64th section on a geodetic grid. Additionally, the condition of each site was assessed in the field. Erosion and other damages were noted carefully and an estimate of the effects of the project was made.

Site Definition Criteria. Definition of habitation sites (see below) in some areas posed special difficulty. Colluvial/alluvial fans along the Similkameen River are mantled with rock that exhibits natural fracture characteristics that closely resemble those associated with human modifications. In no instance could fire-cracked rock be used as the sole criterion for identifying sites; there simply were too many locations where naturally occurring fire-cracked rock predominated. In this respect, the study area resembles the Kootenai River valley in northwestern Montana. In both areas we were forced to adopt more stringent criteria for defining sites: to be identified as a cultural site, a location had to produce strongly patterned chonchoidally flaked high-quality stone materials, preferably on materials foreign to the immediate location.

3.1.3 Laboratory/Analysis. The reconnaissance identified and described 36 previously undocumented cultural resource sites within the study area in addition to the 10 already on the lists. Information concerning these sites was analyzed to determine categories of sites, very generally estimate their significance, and evaluate the impact of the project upon the resources. In addition, because artifacts were collected to establish site identity and to characterize site chronology, recovered specimens are described.

FIGURE 3-1

SITE DISTRIBUTION

Deleted for Public Distribution

3.1.3.1 Categories of Cultural Resource Sites.

Prehistoric Sites. These sites were occupied or used before 1811 A.D. (the date of arrival of the first Euro-Americans in the region) and exhibit tools of aboriginal manufacture as the primary in situ artifacts. The two basic kinds of prehistoric sites found in the study area were habitation and nondomestic sites.

Habitation Sites. These sites exhibit portable and nonportable artifacts associated with human occupation areas. Habitation sites are represented by three classes: temporary camps, rockshelters, and central bases (housepit sites). Temporary camps are sites without evident structures and have minimal complexity of assemblages; rockshelters are camps in naturally sheltered rock overhangs; and central bases here area considered sites with residential structures or housepits.

Nondomestic Sites. These sites exhibit evidence of human modification but lack artifacts generally associated with occupation areas. The category includes pictograph/petroglyphs and talus pits or burials.

Historic Sites. These sites were occupied following 1811 A.D. and exhibit materials manufactured or produced by Euro-American technology as a major component of the in situ visible artifact assemblage. Historical sites are subcategorized as: municipal (Nighthawk townsite), domestic (various homestead sites); power generation (Enloe Dam) and commercial (various mining claims).

3.1.3.2 Significance. According to nomination criteria for the National Register of Historic Places (36 CFR 60.6), the quality of "significance" is present in sites which possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that have yielded, or may be likely to yield, information important in prehistory or history. Regardless of the administrative definition of significance, resources at a project must at least be treated as though they are significant until they can be investigated sufficiently to establish the precise level of significance site-by-site. Level of significance is based upon the potential a site or group of sites has for contributing useful information regarding human paleoecology, or culture history, or culture pr cess. For professional archaeologists to evaluate a site by application of significance criteria, the results of a detailed study, including subsurface testing, must be available. Thus, until such investigations have been concluded and the evidence evaluated, each site must be considered significant. It is possible to consider the significance of an entire array of cultural resources after a reasonably complete reconnaissance without prejudice toward the site-by-site significance evaluation. The significance of the resources at the project was evaluated in light of both existing knowledge of the area and several important regional archaeological problems.

3.1.3.3 Impacts. The project may have several kinds of impacts on cultural resources. For the purpose of this report, "impact" is defined as "unmitigated adverse affects upon the integrity or location of a cultural resource site." A direct primary impact is damage to a cultural resource site that happens during project construction; a direct secondary impact is an effect directly caused by project construction, such as increased bank erosion resulting from pool raise and power generating operations. Damage to sites by groundwater saturation from high pool levels also is a direct secondary effect. Indirect impacts include variable effects on cultural resource sites caused by project development such as intensified artifact predation following increased recreational useage of public lands that would not have occurred if the project did not exist. Increased urbanization on flood protection areas as well as intensified agricultural use of irrigated lands also falls in this category. The kind of impact on sites in the study area has been assessed, but no attempt has been made to describe the specific extent of the impact.

3.1.3.4 Artifact Descriptions. Artifacts were described in commonly used systems to bolster the regional comparative data base. The artifact catalog was developed using Ashton-Tate's dBase III+ in MS-DOS. The basic descriptive system chosen was that of Sullivan and Rozen (1985) for unmodified chipping debris, and a modified version of the Chief Joseph Dam archaeological project's common sense categories for tools and modified or used chipping debris (Campbell 1985; Chatters 1986b). In addition to the general artifact cataloging, we also classified projectile points using a modified version of the system developed by Lohse (1985) for the Chief Joseph Dam archaeological project (Chatters 1986b). Appendix C contains a full description of the classification systems and appendix D is the artifact catalog. We have chosen to photographically present as much data as possible to convey the strength of expression of the mid-Holocene Cascade lithic technology, a demonstration that otherwise can elude classification.

3.2 Results.

3.2.1 Site Inventory. Previous reconnaissance in the Similkameen Basin identified 10 cultural resource sites in the study area. Of these, 3 are exclusively historic, 6 are exclusively prehistoric, and 1 is of dual association. The Enloe Dam site is on the Washington State or National Register of Historic Places (as of February 1985). The present reconnaissance identified 36 additional prehistoric and historic sites to which Smithsonian River Basin Surveys trinominal designations have been assigned. Of these, 6 are exclusively of the historic period, 22 are exclusively prehistoric, and 8 exhibit dual archaeological associations. Detailed descriptions of the sites are available in the completed site record forms included as appendix E; table 3-1 summarizes the cultural resources; and figure 3-1 shows the distribution of cultural resource sites in the study area and vicinity.

TABLE 3-1
CULTURAL RESOURCE SITE INVENTORY

Site	Period	Age	Kind	Function	Geological Context	Condition
45-OK-156	Prehistoric	Late	Nondomestic	Pictographs	On medium terrace and alluvial fan	Good
45-OK-367	Prehistoric	5000-3000	Habitation	Temporary fish camp?	Medium terrace and alluvial fan	Poor
45-OK-368H	Historic	1911-1959	Nondomestic	Municipal, power	On a variety of landforms	Dam good, town poor
45-OK-386	Prehistoric	Unknown	Nondomestic	Talus pits	Talus	Good
45-OK-387	Historic	Unknown	Habitation	Unknown	High alluvial fan	Good
45-OK-388	Prehistoric?	Unknown	Nondomestic	Cairn	Medium alluvial fan	Good
45-OK-402	Prehistoric	Unknown	Nondomestic	Pictograph	On bedrock above lake	Good
45-OK-414H	Historic	1850-1860	Nondomestic	Placer mine	Medium to high river terrace	Good
45-OK-514	Prehistoric	Unknown	Nondomestic	Talus pits	Talus slope onto medium terrace	Partly destroyed
45-OK-515	Prehistoric	Unknown	Nondomestic	Talus pit	On medium terrace in talus slope	Good
45-OK-528H	Historic	1900's	Habitation	Temporary Camp	Old high flood channel and alluvial fan	Good, no structures
45-OK-529	Prehistoric	Unknown	Habitation	Temporary fish camp	Medium high river terrace	Good, surface scars
45-OK-530H	Historic	1900's	Habitation	Mining and Domestic	High river terrace, alluvial fan	Partly disturbed
45-OK-531	Prehistoric	Unknown	Habitation	Temporary camp	Medium high terrace, alluvial fan	Good
45-OK-532	Prehistoric	5000-3000	Habitation	Temporary camp	Alluvial fan on medium terrace	Moderately disturbed
45-OK-533H	Historic	1900's	Habitation	Domestic and mining	High alluvial fan	Fair
45-OK-534	Prehistoric	Unknown	Habitation	Temporary camp	Low terrace and alluvial fan, rocky	Probably poor
45-OK-535	Prehistoric	pre-3000	Habitation	Central base?	Colluvium on intermediate terrace	Partly graded
45-OK-536H	Historic	Unknown	Habitation	Domestic	Low river terrace with alluvium	Good, no buildings
45-OK-537	Prehistoric	post 2000?	Habitation	Central base	Medium river terrace, shaley loam	Good
45-OK-538	Prehistoric	Late	Nondomestic	Pictograph	Rockshelter, high terrace	Good
45-OK-539	Prehistoric	Unknown	Habitation	Temporary camp?	Medium terrace and alluvial fan	Partly disturbed
45-OK-540	Prehistoric	post 2000?	Habitation?	Central base?	Medium terrace and alluvial fan	Partly graded
45-OK-541	Prehistoric	Unknown	Habitation	Central base	Medium river terrace and alluvial fan	Partly disturbed
45-OK-542	Prehistoric	Unknown	Habitation	Central base?	Medium river terrace, alluvial fan	Disturbed by feedlot
45-OK-543H	Historic	1900's	Habitation	Domestic (homestead)	Medium terrace and alluvial fan	Good, no buildings
45-OK-544H	Historic	1900's	Habitation	Domestic	Small alluvial fan	Good, no buildings
45-OK-545	Prehistoric	6000-4000	Habitation	Camp or Central Base	Site is on low terrace or beach ridge	Poor, disturbed
45-OK-546	Prehistoric	9000-200	Habitation	Central base, camp?	Medium terrace with alluvial fan	Good but inhabited
45-OK-547	Prehistoric	Prob. late	Habitation	Domestic and camp	Low to high terrace and alluvial fan	Good, no buildings
45-OK-548	Prehistoric	Early?	Habitation	Temporary camp?	On a very high terrace at spring	Partly disturbed
45-OK-549	Prehistoric	Unknown	Habitation?	Temporary camp?	Very high terrace.	Good
45-OK-550	Prehistoric	Unknown	Habitation	Temporary camp?	High terrace and alluvial fan	Destroyed by mining
45-OK-551	Prehistoric	5000-3000	Habitation	Central base	On medium terrace and alluvial fan	Good
45-OK-552	Prehistoric	Unknown	Habitation	Domestic, camp	On toe of active alluvial fan	Good
45-OK-553	Prehistoric	Unknown	Habitation	Temporary camp?	Fossil dune on low terrace	Fair, eroding
45-OK-554	Prehistoric	Unknown	Habitation	Central base	Medium terrace and alluvial fan	Good
45-OK-555	Prehistoric	Early?	Habitation	Temporary camp	Fossil dune on low terrace	Good, but eroding
45-OK-556	Prehistoric	Late?	Habitation	Central base	Medium terrace and alluvial fan	Good, some borrow
45-OK-557	Prehistoric	8000-4000	Habitation	Temporary camp	Fossil dune on low terrace	Fair, some erosion
45-OK-558	Prehistoric	8000-4000	Habitation	Temporary camp	Dune on medium terrace and alluvial fan	Fair
45-OK-559	Prehistoric	Early?	Habitation	Temporary camp?	Dune on medium terrace remnant	Good
45-OK-560	Prehistoric	Early?	Habitation	Temporary camp?	Medium terrace and alluvial fan	Good
45-OK-564	Prehistoric	Early	Habitation	Temporary camp?	High terrace and alluvial fan	Poor, road cut
45-OK-565	Prehistoric	Early?	Habitation	Temporary camp?	Medium terrace and alluvial fan	Good
45-OK-566	Prehistoric	Early	Habitation	Temporary fish camp	Medium/high terrace and alluvial fan	Poor, much erosion

3.2.2 Artifact Inventory. As a result of the study, we have identified a substantial number of individual artifacts in a number of different materials. There are also 14 stylistically classifiable projectile points and fragments. The following subparagraphs discuss this assemblage from different viewpoints.

o Materials. Aside from the historic artifacts of ceramic, glass and metal, artifacts in the assemblage occur in several different lithic suites; the most common material is metasedimentary rock, comprising varieties of argillite, greenstone, greenschist, hornblende-biotite, mudstone, quartzite, etc. Sedimentary rocks include silicified sandstone/mudstone, and various suites of cryptocrystalline silica. Plutonic basics include granodiorite. There are volcanics such as basalt, dacite, and obsidian. Table 3-2 summarizes the numbers of specimens in each major group.

TABLE 3-2
LITHIC MATERIALS BY MAJOR GROUP

Group	Count
Metasedimentary	
Argillite	161
Mudstone	22
Schist	5
Quartzite	4
Sedimentary	
Sandstone	1
Silicified sandstone/mudstone/siltstone	4
Cryptocrystalline silica	30
Plutonic basic	
Granodiorite	1
Volcanic	
Obsidian	3
TOTAL	231

It can be seen that metasedimentary rocks, many of which outcrop locally, predominate. Surprising is the number of instances of obsidian, as this material commonly is a small minority type in the Okanogan Valley and is not typically found in casual surface collections. The large proportion of projectile points manufactured of argillite (or fine-grained basalt) is indicative of Cascade affiliation. The majority of microblades also are made of argillite or basalt.

o Object Types. Object type occurrence is summarized following a table developed to accentuate the functional affiliations of tool classes (Salo 1985). While the current data are too few and too biased to be of much use for classifying sites functionally, they may be added to others developed in the future for such purposes.

The following table shows the occurrence of various object types, including each use of an object under each object type heading (table 3-3). Examples of some of these objects are shown in plates 3-1, 3-2, and 3-3.

TABLE 3-3
ARTIFACT OBJECT TYPE SUMMARY

Complex	Activity	Function	Object Type	Count
Economic	Abrading	Milling	Edge Ground Cobble	1
	Cutting	Carving	Blade	1
			Microblade	4
			Utilized	7
	Penetration	Drilling	Drill	1
		Projectile Impact	Projectile Point	10
	Percussion	Chopping	Chopper	2
		Flaking	Complete Flake	84
			Broken Flake	40
			Flake Fragment	31
			Debris	16
			Core (One Microblade Core)	20
			Bifacial Retouch Fragment	4
			Resharpening Flake	4
			Biface	9
		Pounding	Hammerstone	1
			Pestle	1
			Anvilstone	1
	Scraping	Hard	Graver	1
			Spokeshave	4
		Soft	Scraper	5
			Tabular Knife	3
TOTAL				250

It should be noted that we also recorded other occurrences of objects at several sites, but these objects are in private collections.

PLATE 3-1
PROJECTILE POINTS AND MICROBLADES

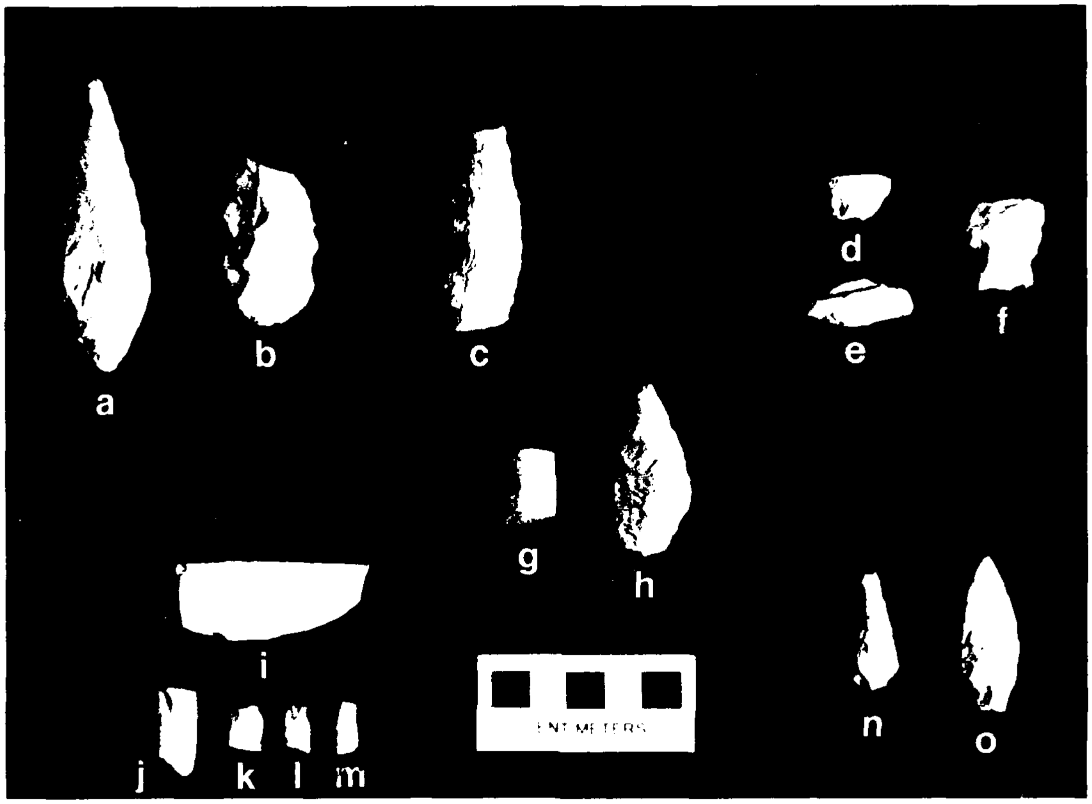


PLATE 3-1 KEY

a. Cascade A (45-OK-557); b. Cascade A (45-OK-558); c. Cascade C (45-OK-557); d. Unclassified Cascade Base (45-OK-557); e. Cold Springs Side-Notched (45-OK-558); f. Cold Springs Side Notched (45-OK-545); g. Unclassified Stemmed (45-OK-535); h. Unclassified Stemmed (45-OK-532); i. Microblade Core (45-OK-558); j. Microblade (45-OK-535); k. Microblade (45-OK-566); l,m. Microblades (45-OK-558); n. Nespelem Bar (45-OK-367); o. Nespelem Bar (45-OK-551)

PLATE 3-2 KEY

a. Hammerstone (45-OK-529); b. Chopper/Edge Ground Cobble/Anvil Stone (45-OK-535); c. Pestle (45-OK-535)

PLATE 3-3 KEY

a. Biface (45-OK-557); b. Utilized Biface (45-OK-560); c. Biface (45-OK-545); d. Drill (45-OK-566); e. Spokeshave (45-OK-566); f. Scraper/Spokeshave/Graver (45-OK-531); g. Scraper (45-OK-554); h. Bifacially Retouched/Utilized Object (45-OK-556); i. Tabular Knife (45-OK-551); j. Biface (45-OK-542); k. Complete Flake (Cascade Technology) (45-OK-367); l. Complete Flake (Cascade Technology) (45-OK-564)

PLATE 3-2
VARIOUS LARGE STONE TOOLS

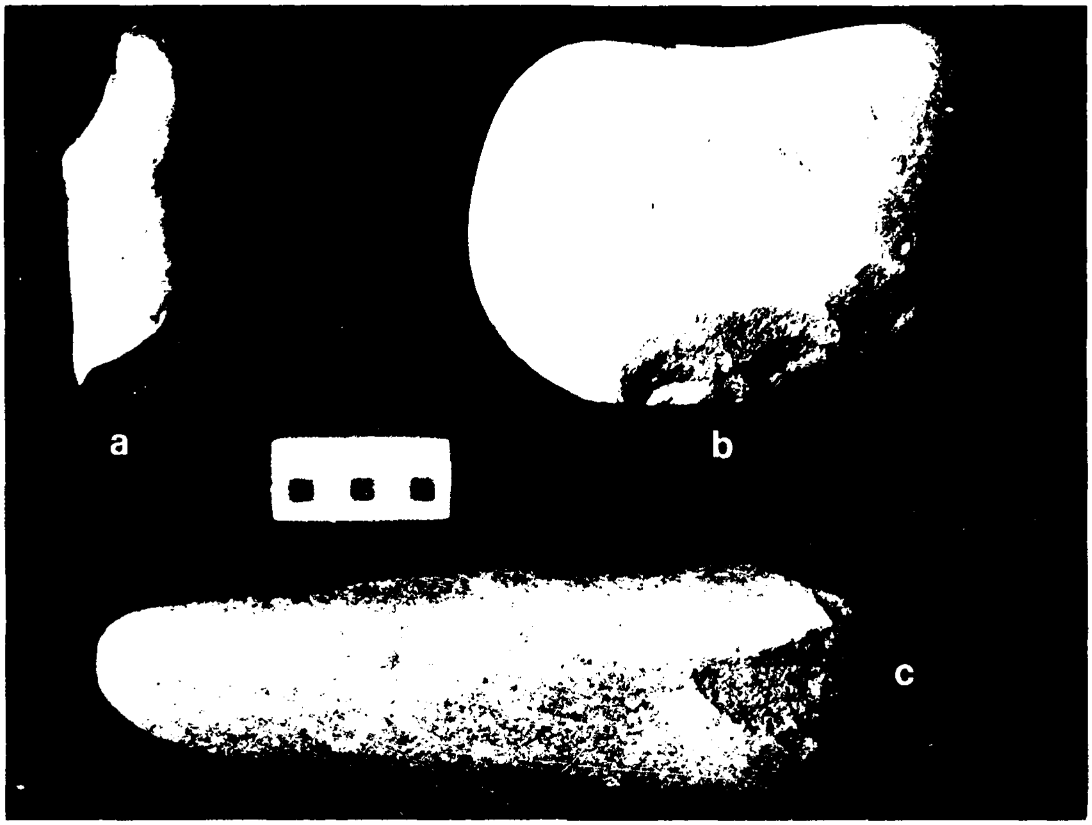


PLATE 3-3
SMALL STONE TOOLS

Briefly, these include 3 net weights, 5 pestles, 1 biface, 9 projectile points, and one stone bowl. Some of these objects are illustrated in figure 3-2 and plates 3-4 and 3-5.

o Stylistic Inventory. The stylistic inventory includes projectile points (Lohse 1985), microblades (Campbell 1985; Grabert 1974; Sanger 1970; Munsell 1967), and a decorated stone bowl. All of the projectile points are early to mid-Holocene in chronological affiliation, and most are of Kartar or Vantage and Hudnut or Frenchman Springs in cultural affiliation. Only one point is from the later Coyote Creek, Cayuse or Kamloops Phase. The following table shows the distribution of stylistic elements (table 3-4):

TABLE 3-4
STYLISTIC ELEMENT SUMMARY

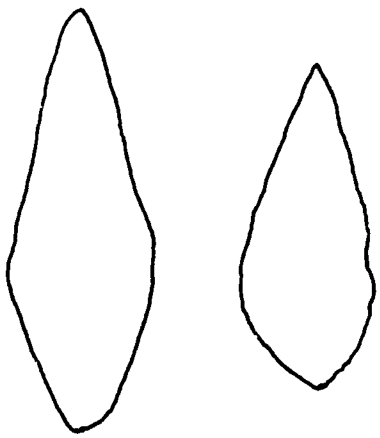
Element Type	Count	Location 1/
Projectile Point		
Windust C	1	(45-OK-546)
Cascade A	4	45-OK-557, -558, (-546(2))
Cascade C	3	45-OK-557(1),(-545)
Mahkin Shouldered	1	(45-OK-557)
Cold Springs Side Notched	2	45-OK-545, 45-OK-558
Nespelem Bar	3	45-OK-367, (-557(2))
Plateau Side-Notched	1	(45-OK-546)
Unclassified Stemmed	2	45-OK-532, -535
Microblade	4	45-OK-535, -558/2, -566
Microblade Core	1	45-OK-558
Stone Bowl	1	45-OK-540
TOTAL STYLISTIC ELEMENTS	22	

1/ Parentheses indicate specimens in private collections.

It is evident that most of the elements show strong affiliations with Cascade/Kartar and Frenchman Springs/Hudnut phase assemblages. Cayuse/Coyote Creek/Kamloops phase associations are present but strongly in the minority. As the reconnaissance is strongly biased, no firm conclusions about frequency of the study area's occupations may be drawn, but the lack of late stylistic elements in local amateur

FIGURE 3-2
ILLUSTRATION OF ARTIFACTS IN PRIVATE COLLECTIONS

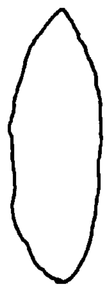
Approximately 3/4 Scale



Cascade A

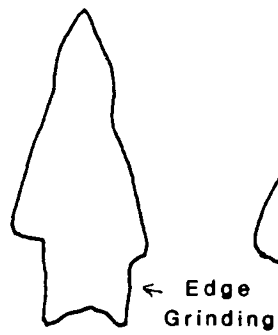
45-OK-546

Deep



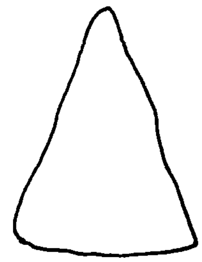
Cascade C

45-OK-545



Windust C

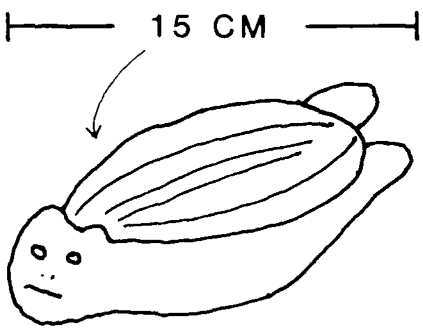
45-OK-546



Biface

45-OK-546

Deep



Serpentine Series Rock

45-OK-540

Plateau Side-Notched

45-OK-546

Shallow

2 CM

PLATE 3-4 KEY

a. Pestle (45-OK-557); b. Pestle (45-OK-557); c. Pestle (45-OK-557); d. Pestle (45-OK-556); e. Pestle (45-OK-557)

PLATE 3-5 KEY

All artifacts from 45-OK-557; a-c. Bi-notched Net Sinkers; d. Mahkin Shoulder Lanceolate; e. Biface; f. Cascade C; g,h. Nespelem Bar

PLATE 3-4
LARGE STONE TOOLS IN PRIVATE COLLECTION

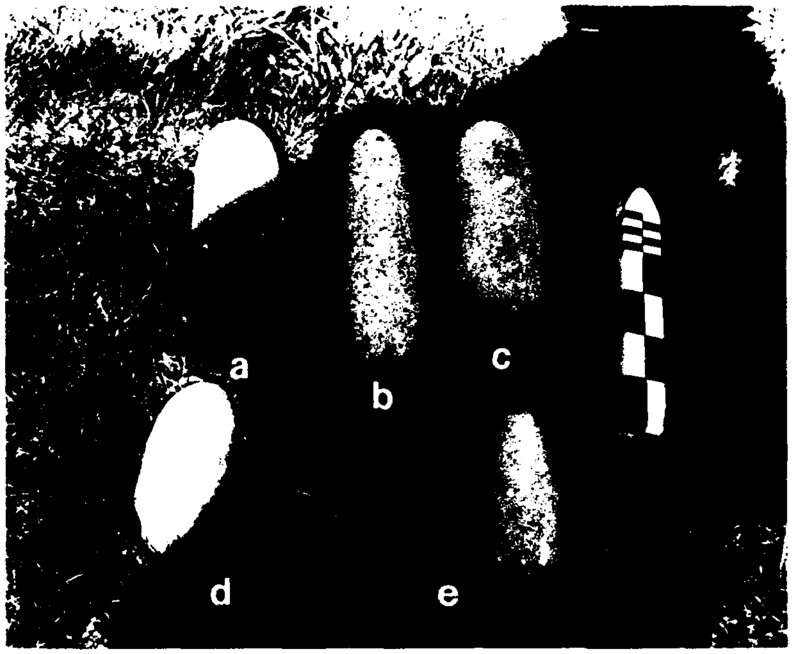
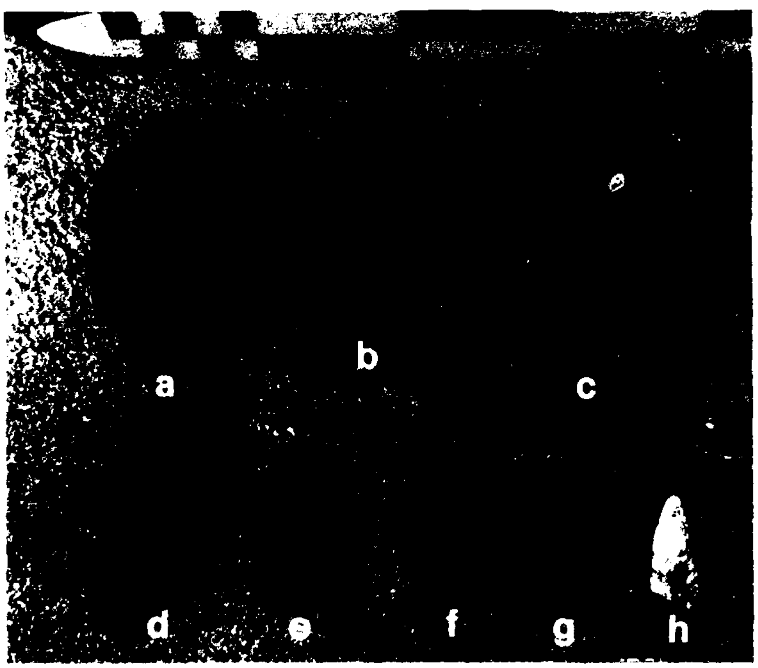


PLATE 3-5
SMALL ARTIFACTS IN PRIVATE COLLECTION



collections strongly suggests that the bias in our data does not rule out the probability that occupation of the project was most intense in the early middle Holocene.

3.2.3 Tephra Description. As part of the objectives of this reconnaissance, we were able to record unusual occurrences of geological phenomena that would help us learn more about the study area's geochronology. We located and described a deposit of apparent Mt. Mazama tephra in a recently-excavated gravel quarry in the southwest quarter of the northeast quarter of Section 34, Township 40 North, Range 25 East, Willamette Meridian. We were unable to obtain an exact elevation of the surface of the ash deposit, but may be able to reconstruct the elevation fairly closely by aerial photogrammetry. Our current best estimate of the elevation of a hub set at the top of the waterlaid ash is approximately 1174 feet.

The deposit occurs in an alluvial/colluvial fan located about 100 feet north of where the Chopaka road turns north at the west side of the Similkameen valley floor at the northern end of Palmer Lake. The ash occurs in a thick bed about three and one half meters below the surface of the fan (plates 3-6 and 3-7). The following is a detailed description of the deposit.

Measurement Below Surface (Centimeters)	Description
0-5	Humus
5-25	Light brown to light grey-brown sandy loam with 30 cm to 3 cm sized subangular to angular granite/schist/shale cobbles and pebbles.
25-35	Buried B horizon, laterally discontinuous. Description same as above, but olive-grey.
35-55	Same as 5-25.
55-60	Buried B horizon, laterally discontinuous. Description same as 25-35 cm; indistinct boundary to:
65-70	Description same as 5-25.
70-95	Laterally continuous buried B; description same as 55-60.
95-115	Very light brown/yellow sandy gravelly loam with 10 cm to 1 cm sized inclusions of same lithology, attenuates to south.

PLATE 3-6
TEPHRA DEPOSIT AT NORTH END OF PALMER LAKE

PLATE 3-7
CLOSER VIEW OF TEPHRA DEPOSIT

Tephra description continued:

Measurement Below Surface (Centimeters)	Description
115-140	Buried B horizon, light to medium brown clay loam, with 30 cm to 10 cm sized granitic subangular clasts.
140-200	Description same as 95-115.
200-240	Buried B horizon, olive grey to light brown, 30 cm to 1 cm sized subangular clasts with occasional 50 cm sized granite and schist angular clasts.
240-260	Same description as 140-200.
260-330	Highly calcareous very light to medium light brown very fine-grained clayey ashy sediment with 10 cm to 1 cm sized angular schist and granite clasts.
330-340	Very light brown ash with pea to walnut sized subangular schist (10 percent) and granite clasts.
340	Hub inserted.
340-342	Laterally continuous laminated ash with minute rounded granitic clasts. Color is very light pink/brown to white.
342-347	Very light brown to light yellow brown ash with sand sized clasts fining upward to clay-sized.
347-357	White to light yellow-brown ash with sand sized clasts fining upward to clay sized. Sample removed for identification.
357-407	White to light yellow-brown ash with pea to sand sized clasts.
407-412	Mixed silt/clay/ash with no rocks.
412--	Dark brown silt/clay with organic mottling and large rounded boulders.

3.2.4 Preliminary Impact Analysis.

3.2.4.1 Direct Primary Impacts. While the specific effects of the dam and reservoir construction cannot be known until construction details are disclosed and the extent and character of the sites have been determined, it is evident that the project construction would affect 15 cultural resource sites immediately (table 3-5). Effect would be either from actual excavation connected with construction or by inundation. As with direct secondary effects, direct primary effects would selectively affect different aspects of the region's cultural resources. None of the direct primary effects appear at this time to be avoidable.

3.2.4.2 Direct Secondary Impacts. Pool marginal erosion may cause loss of site matrix at 13 sites (table 3-5). In addition, currently unrecorded sites along the banks of the project may be affected. Erosional effects may be selective in different reaches of the project. In the downstream part of the project, nearly all post-Pleistocene aged landforms would be inundated, but in the upper part of the project, pool-marginal erosion would affect lower-lying and presumably younger terraces. In addition, no housepit sites are recorded for the lower reaches of the project, but several in the upper reaches might be affected by the project. If bank protection and stabilization is anticipated for riverbanks below the dam, construction may have adverse effects upon any cultural resources present. Finally, direct secondary impacts may occur at sites through leaching effects of artificially high water table. Organics in sites, including bone, carbonized plant remains, and soil chemical quality may be adversely affected in this manner. Yet-undiscovered sites along Palmer Lake may be especially vulnerable to this kind of damage.

3.2.4.3 Indirect Impacts. Protection from 100-year frequency flooding may facilitate development of an unknown number of acres of urban and agricultural lands. Intensified irrigation also would facilitate development on agricultural lands. Effects upon sites within those areas probably would be adverse. Increased population would increase the changes of vandalism and predation of cultural resources in the project vicinity.

TABLE 3-5
SITE INVENTORY-ADMINISTRATIVE DATA

Site	Project Effect	Site Ownership	Recommendation for Work	Comments
45-OK-156	None	Unknown	Record in detail, photos	Photographed
45-OK-367	Direct primary	Okanogan County PUD	Test for intact parts	Also has Historic component
45-OK-368H	Direct primary	Okanogan County PUD	HAER Documentation	Site is on National Register
45-OK-386	None	BLM	Test for burials	
45-OK-387	None	BLM	None	
45-OK-388	None	BLM	Test for burial	
45-OK-402	None	BLM?	Protect from vandalism	
45-OK-414H	Direct primary	BLM	Document history and map	Some later workings, structure
45-OK-514	None	BLM and Palmer Lake Ranch	Document	Mazama ash documented
45-OK-515	None	BLM	Document	
45-OK-528H	Direct primary	BLM, J. Kernan	Record History,Map	Railroad Camp
45-OK-529	Direct primary	BLM	Test	May be older than Kamloops
45-OK-530H	Direct primary	BLM	Archive search, test	Probable prehistoric site also
45-OK-531	Direct primary	BLM	Test for age, function	May have geologic test holes
45-OK-532	Direct primary	BLM and Okanogan County PUD	Test for age, function	Good bone preservation
45-OK-533H	Direct primary	Unknown	Archival search and map	Probable prehistoric site also
45-OK-534	Direct secondary	N. Cutchie	Test for age and function	
45-OK-535	Direct secondary	N. Cutchie	Test for age and function	Also has historic homestead
45-OK-536H	Direct secondary	J. Lenton	Archive research, map	Probable prehistoric site also
45-OK-537	Direct primary	N. Cutchie	Test for age, function	Housepits, possible deep site
45-OK-538	None	H. Allemandi	Record pictographs, test	May have burials
45-OK-539	Direct secondary	L. Allemandi	Confirm site	Occupied homestead also
45-OK-540	Unknown	L. and H. Allemandi	Confirm site	Reported, has stone bowl
45-OK-541	Direct secondary	T. and S. Cohen	Test for age and function	Occupied Indian allotment
45-OK-542	Direct secondary	Palmer Lake Ranch	Test for age and function	Wintering reported by Cohens
45-OK-543H	None	State and Palmer Lake Ranch	Archival search and map	
45-OK-544H	Direct primary	Palmer Lake Ranch	Archival search and map	
45-OK-545	Direct primary	Palmer Lake Ranch, Fancher Cattle Co.	Test intact part	Site has been collected
45-OK-546	None	Palmer Lake Ranch	Test age and function	Definite Windust component
45-OK-547	Direct secondary	Unknown	Test and archive search	Historic homestead also
45-OK-548	None	J.E. Allemandi	Confirm site, then test	Shell midden reported
45-OK-549	None	J.E. Allemandi	Confirm site and test	Buried shell and pestle report
45-OK-550	None	J. Metcalf	None	Historic mining site also
45-OK-551	Direct secondary	J. Metcalf	Test for age and function	Housepits
45-OK-552	Direct secondary	J. Metcalf	Test for age and function	Historic homestead also
45-OK-553	Direct primary	J. Metcalf	Test for age and function	May have minor stratification
45-OK-554	Direct secondary	J. Metcalf	Test for age and function	Housepits
45-OK-555	Direct secondary	J. Metcalf	Test for age and function	May have stratification
45-OK-556	None	J. Metcalf	Test for age and function	Housepit site
45-OK-557	Direct secondary	J. Metcalf	Test for integrity, func.	Strong Cascade component
45-OK-558	None	J.E. Allemandi	Test for age and function	Microblades and cores
45-OK-559	Unknown	J.E. Allemandi	Test for age and function	Probably Cascade in age
45-OK-560	Direct secondary	State, Silver Star Development Co.	Test for age and function	Probably late Cascade age
45-OK-564	None	Unknown	Test for age and extent	Definite Cascade affiliation
45-OK-565	Direct primary	BLM	Test for age and function	Possible buried strata
45-OK-566	Direct primary	Okanogan County PUD	Test for age and extent	Microblades present

SECTION 4. DISCUSSION OF FINDINGS.

4.1 General Discussion. While the results of this reconnaissance are not sufficient to establish the scientific importance of individual sites with one important exception, they are adequate to identify several areas in which the study area's sites as a unit comprise an important resource base.

4.1.1 Local Reconnaissance Procedures. There is a lesson in this reconnaissance project for others that may occur in the Okanogan region. We found that site identification took great diligence in the field, as many of the sites are found in areas where naturally-occurring soil and rock can easily mimic cultural debris. This problem is bound to be especially severe in upland areas where vegetation cover from algae, moss and grass to dense alpine forest adds another obscuring factor. We found that our intuition about site locations was very valuable, as it was confirmed in about 9 out of 10 cases. Unfortunately for methodological rigor, we wasted little time in unproductive areas, so we can say relatively little about where sites are not found. Experience suggests that reaches of the river without alluvial fan development and broad, level flood plains have the lowest concentrations of sites, but even here, exceptions abound. As there can be little protection of cultural resources without knowing that resources are present, inventory work should proceed with great deliberation and care.

4.1.2 Windust Phase Assemblages. As noted in chapter 3, sites with early Holocene or late Pleistocene occupations associated with the Windust Phase of Columbia Plateau prehistory are very rare in the northern Plateau. To date, they are known only from a severly eroded site near Wenatchee, several sites around Pend Oreille Lake, and two sites at Kettle Falls. None have been found in the Okanogan Basin before the discovery of site 45-OK-546 on the northeast shore of Palmer Lake. With a reported stratum containing Windust-like projectile points buried some 1.5 meters below surface and associated with organic remains (mussel shell), this may be one of the most important sites in the region for investigation of Windust Phase characteristics. It is of considerable interest that the majority of Windust Phase occupations in the northern Plateau have been found next to lakes. This locational phenomenon may indicate that either the prehistoric populations were adapted to lakeside living, or that a lakeshore environment is the most likely place for the evidence of their presence to be preserved. Both of these possibilities might be partly correct. If the Windust occupants are pioneer offshoots of Western Pluvial Lake Tradition occupants of the Great Basin as some investigators have surmised, these early peoples very well may have preferred to center their existence around lakes where a familiar livelihood could be practiced. Also, lakes may have provided hydraulic buffers against the erosive forces of glacial-melt swollen rivers in the very late Pleistocene or early Holocene, preventing destruction of sites along their shores while sites of similar age along mainstem rivers were swept away.

4.1.3 Vantage Phase Occupations. Although the reconnaissance was not systematic enough to conclude with certainty that Vantage Phase occupation predominates in the study area's assemblages, we cannot escape the strong impression that Vantage occupations occur in the upper Okanogan basin with greater frequency than in other areas in the Columbia Basin. After considering our findings in light of the previous work of Grabert and Wyatt, we believe that the Okanogan Vantage Phase assemblages are most frequently found near small lakes, in a distributional pattern strikingly similar to that of the Windust Phase sites. In the later Frenchman Springs or Hudnut Phase, sites are more widely distributed. At present, published work is hopelessly biased toward inventory in the vicinity of lakes, so we cannot scrutinize our impression much farther. The study area seems to have ideal ingredients for a careful scientific study of Vantage Phase siting. It has a very high potential for good geomorphic control in the form of numerous Mazama tephra deposits. Sites are abundant and development has not been so severe as to eradicate substantial parts of the prehistoric record. There are many sites in areas where stratification might be expected, and there appears to be a very good chance that even very early sites might be found in good stratigraphic context.

There is another intriguing possibility that could help explain the relatively large mid-Holocene site array. We suspect that there might have been a change in accessability of the Similkameen Basin to anadromous fish at some time in the Holocene. We have noted the probability that downcutting at Shanker's Bend was not completed until sometime after the Mazama ashfall. From Shanker's Bend to the damsite the Similkameen River flows through a similar constrained, very rocky and narrow channel, where the local hydrology in the past may have differed substantially from modern conditions. While we have no direct evidence that salmon were present in the basin above Enloe, the apparent high percentage of sites dating to the mid-Holocene and earlier suggests the possibility that something no longer present may have drawn earlier populations to the area, and at this point the chief suspect is salmon. Direct evidence of their presence might be found in faunal samples from sites around Palmer Lake, and even more direct evidence such as scales or otoliths might occur in sediment cores from Palmer Lake.

Why this part of the Plateau should be so densely occupied during the Vantage or Kartar Phase is an even broader question. In paragraph 2.1.4 we alluded to the ability of the riparian vegetation at the project to withstand change in precipitation patterns. It the warmer, drier climate indicated by pollen records for the period 7-5,000 years ago actually occurred, the upper headwaters of the Okanogan may have been a more desirable place to live than drier areas if the local adaptation required substantial terrestrial fauna for winter survival.

On the other hand, if the relatively high frequency of mid-Holocene occupations in the study area should prove to be valid and salmon can be shown to be absent both from the environment and from the

Vantage/Kartar and Frenchman Springs/Hudnut Phase archaeological sites, the scarcity of late Holocene occupations might be used as one more piece of evidence to demonstrate that late Holocene site distributions probably reflect a cultural adaptive change to reliance on anadromous fisheries and storage to maintain relatively non-mobile central bases. This is especially interesting as most of the sites in the Oroville area appear to be late Holocene in age.

4.2 Significance of the Resources. In light of the previously introduced background information, it is clear that as a whole, the cultural resources in the study area are significant, for specific reasons to be outlined in the following paragraphs, but it is not yet legitimate to estimate significance levels site-by-site.

4.2.1 Legal and Administrative Significance. Under the definition in paragraph 3.1.3.2, the cultural resources in the study area as a whole must be deemed significant, as the individual sites exhibit integrity of location and association and are likely to yield important prehistoric information.

4.2.2 Information Potential. The cultural resources in the study area can provide information about specific problems in local and regional prehistory and history. They may also furnish information important in theoretical development of archaeology and other sciences.

4.2.2.1 Culture History. The cultural resource sites in the study area provide information useful for answering particular questions about the prehistory of the region. Recent work in Canada and the United States indicates that there are some fairly large differences in prehistory ofthe Okanagan Lakes region in Canada and the Okanogan River in the United States. The degree of the differences and their significance have not been demonstrated. The resources in the study area border each of these systems and could provide information needed to understanding the variations. Regional chronologies that have been developed need to be refined locally through field testing. The study area has very early sites that could be invaluable to this process. Differences between the prehistoric and ethnohistorically recorded cultures of this area have not been archaeologically assessed or adequately explained. The problem of population movements and establishment and maintenance of the major ethnohistorically observed cultural boundaries demands resolution. The question of isolated Athabaskan-speaking groups is particularly interesting. Because the study area was populated by Athabaskans until relatively recently and has microblades indicating that it might have been so even in the distant past, it might be useful for studying this problem. Trade routes passed up the Okanogan Valley and connected the Fraser River and Columbia River systems (Wyatt 1972); the role of the local cultural systems in the larger system might be assessed using data from the study area. Historic mining sites have information on the life-ways of early mining communities; they also may be able to provide data on the history of Chinese miners in the mid-19th century.

4.2.2.2 Culture Process. Significant regional changes have occurred in local human land use patterns in the past 10,000 years (Campbell 1985; Chatters 1986b), the most recent and drastic of which began with the arrival of Euro-American settlers. Documents outlining the sequences are nonexistent; the only records are unprocessed data in historic and prehistoric archaeological sites (homesteads and domestic sites), property abstracts, memories of living persons, ethnohistories, and haphazardly compiled records (diaries, newspaper archives, etc.). Early historic changes are particularly important for culture process studies as the changes resulted from interactions between agricultural and hunting/gathering cultural systems. The cultural resources of the study area represent a source of information that could be used to study these changes.

The study area also has a distinctive combination of environmental features. It contains a lacustrine system connected to a major subbasin of the Columbia River through a fluvial system blocked to anadromous fish passage. The high proportion of Vantage/early Frenchman Springs assemblages in the system suggests that either the presence of anadromous fish may have been a less critical human habitat criterion for the earlier as opposed to later periods of human occupation, or that the area may have been accessible to such fish at times in the past. The study area has data that may be used to investigate this problem.

4.2.2.3 Paleoecology. Human habitation sites concentrate botanical and faunal remains and provide information about paleoenvironments and human ecology of the region. The study area is an example of a complex environment with diverse Upper Sonoran, lacustrine and riparian habitats. Archaeological sites may contain fish remains that can disclose whether the study area provided habitat to anadromous species that historically were blocked in the vicinity of Enloe Dam. The quantity of information contained in the local cultural resource sites is likely to be quite high.

4.2.3 Public Significance. The cultural resources at the project are likely to have values beyond their intrinsic worth to science.

4.2.3.1 Educational and Interpretive Interest Value. The project's resources are significant for the development of educational and interpretive programs, but must be investigated to take full advantage of their public interest value. Public appreciation of archaeology is at a high level; the demand for archaeological tours, museums, or interpretive centers in the National Park System increased in the 1970's at a rate faster than demands for recreational services (Moratto and Kelly 1976). Material and knowledge from the area may be used for displays in local museums, in circulating exhibits for educational purposes, and in popular publications.

4.2.3.2 Local Financial Benefits. Museum or interpretive center visitation can increase tourism benefits to the local economy; funding of archaeological investigations will provide income through purchase of support facilities, transportation and heavy equipment rental services, and supplies and equipment.

SECTION 5. CONCLUSION AND RECOMMENDATIONS.

5.1 Conclusion. Only a small part of the study area has been inventoried for cultural resources, but even this small area has a remarkable array of cultural resources that probably are significant for study of prehistoric and historic research topics. The salient topics are early and early mid-Holocene hunter-gatherer adaptations and the development of historic mining industry, especially the involvement of Chinese in the earlier phases.

5.2 Recommendations. Site-by-site recommendations are shown in table 3-5. There are, however, some general recommendations. The study area should be carefully redefined to include the actual project impact area. If the project is authorized, there should be a thorough reconnaissance of the project area early in the project design phase. Close attention should be paid to identifying data sources needed to carry out geomorphological studies that would be required for site-by-site significance assessments during later project phases. Inventory around Palmer Lake should be carried out with especial care, as the likelihood of discovering significant early sites is high. Information in this report should be provided to other agencies pursuing other project alternatives to afford maximum protection to the cultural resources that may be present in the alternative project areas.

APPENDIX A

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APPENDIX B

CONTACTS

APPENDIX B

CONTACTS

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APPENDIX C

ARTIFACT DESCRIPTION KEY

APPENDIX C

ARTIFACT DESCRIPTION KEY

1. Tools and Debitage. The classification system selected for the study's artifacts is designed to produce data that may be used to compare the local assemblages with those identified and described by other archaeological projects, especially those at the Wells and Chief Joseph Dam projects (Campbell 1985; Chatters 1986). The current system differs as it accomodates tools with multiple different uses. In addition, stone flaking debris is classified in a new and simplified system developed for general research purposes and now being applied at various projects throughout the United States (Sullivan and Rozen 1985). Data are managed using a version of Ashton-Tate's dBaseIII+ relational database program. Classificatory fields are: site: class of object number 1, 2, and 3; and material type with notes.

The following paragraphs identify classification codes, class name, and definition. The discussion is grouped by debitage categories, tools, and material kinds.

1.1 Debitage Categories.

Code	Class Name	Definition
COF	Complete Flake	Has single interior surface (ripple marks, force lines, bulb of percussion), intact point of applied force (striking platform, force lines), intact margins (distal hinge or feather terminations, no major lateral breaks or snaps).
BRF	Broken Flake	Has single interior surface and point of applied force, but margins are not intact.
FFG	Flake Fragment	A single interior surface is discernable, but the point of applied force and margins are absent.
DEB	Debris	No single interior surface is discernable, the point of applied force is absent, and the margins are not intact.
BRT	Bifacial Retouch Flake	Flake or chunk that shows retouch along both surfaces of an edge. Retouch is defined as scars of intentionally removed flakes, larger

Code	Class Name	Definition
BRT	Bifacial Retouch Flake (cont).	than scars left by utilization, but smaller than flakes removed to thin the center of an object. Retouch differs from bifacial thinning as the latter includes the entire surface of a flake as opposed to just an edge. If original flake surface is present, items are classified as bifacially retouched flakes.
RES	Resharpening Flake	A flake removed from a tool to resharpen the tool. All objects in this class exhibit polishing or abrading wear. Those objects with other wear are handled as debitage because of difficulties in distinguishing between such wear and platform preparation.
COR	Core	What remains of a piece of stock after a lithic reduction sequence. Ideally a core should have a prepared platform with at least two flake scars removed from it. Cores without prepared platforms exist, but all must show two or more flake scars. The scars should be large enough so that the flakes removed could serve some purpose beyond the retouch of the core.

1.2 Tool Categories.

Code	Class Name	Definition
UTL	Utilized Flake	Flake, or flake fragment that shows utilization (wear) along the edges of one surface. Also stands for utilization on other debitage categories.

Code	Class Name	Definition
BIF	Biface	All or part of a bifacially worked object. Bifaces have large flakes removed to thin the surface. Some objects coded as bifaces are projectile points or parts of projectile points. Bifaces are distinguished from projectile points by shape, as they have broader outlines and lack formed stems.
PPT	Projectile Point	Bifaces with identifiable hafting elements; may be whole or fragmentary, including base, tips, or midsections as long as enough hafting element is attached.
TKN	Tabular Knife	A wafer of quartzite, schist, basalt etc. The edges are unifacially or bifacially retouched, probably by bipolar technique, which in combination with wear is the minimal requirement for tabular knives.
SPO	Spokeshave	Object with deeply to moderately concave unifacially retouched or worn edge. Utilization results in an abundance of hinged/stepped wear flakes.
DRI	Drill	Objects in the drill class include shaped (worked) drills and objects utilized in a drilling fashion. Shaped drills range from totally manufactured objects to those with only the bit shaped. The manufacture to produce the tip usually is bifacial. The cross section of a drill is that of an irregular foursided polygon (although it may appear to be triangular) and wear should be distributed on two of these surfaces. Wear can be alternating or bifacial; alternating wear shows the direction of use (clockwise or counterclockwise).

Code	Class Name	Definition
GRA	Graver	Gravers range from totally manufactured objects to those with on the graver bit shaped. The manufacture which produces the tip usually is unifacial, leaving a flat plane on one side with unifacial working originating at the flat plane. Utilized gravers have two to three planes that converge at a point.
SCR	Scraper	Flake with steep-edged unifacial retouch or wear that forms a convex edge. The manuwear must significantly alter the shape of the original flake, involving most of an edge.
BLA	Blade	Parallel sided flake with one or two parallel arrises down the center. The flake is about twice as long as it is wide and is greater than 10 mm in width.
MIC	Microblade	Parallel sided flake with one or two parallel arrises down the center of the exterior surface. The flake is approximately twice as long as wide and is less than 10 mm in width. It only proximal end is available, the length criterion is not used. The dorsal side should show that the flakes were removed in order to form the arrises were taken from the same platform as the microblade. These items are associated with mid-Holocene assemblages and may be considered temporally diagnostic.
CHO	Chopper	Cobble with flakes removed to form a large, fairly steep-angled edge. Ideally the edge is sharp enough to cut, unlike the blunt end or edge of a hammerstone which would crush the stock. Wear on a chopper usually appears as crushing and hinge fractures.

Code	Class Name	Definition
HAM	Hammerstone	Hand-sized or somewhat larger cobbles that are unmodified but utilized. Utilization usually is crushing/pecking on the terminal surface or sides. Some hammerstones show modification, usually flaking, probably a form of damage.
ANV	Anvil	Large rock or cobble with wear and/or manufacture present. Anvil stones have convex worn surfaces.
EDG	Edge-Ground Cobble	Battered flat, ovate cobbles with continuous crushing and abrasion on one edge. These differ from faceted hammerstones in that they often have a single bevelled edge, while faceted hammerstones have distinct multiple facets over the majority of their "edges".
PES	Pestle	A cone- or pear-shaped object with a large working end. Wear on pestles typically is grinding and polishing; some hinged chipping may also occur on margins.

Other kinds of debris are included in the catalog:

BON	Bone fragments	Any kind of bone debris or object.
SHL	Mussel shell	Freshwater mussel shell fragment.
HIS	Historic	Any kind of historic period item.
BOT	Bottle fragment	Historic bottle fragment.

1.3 Material Type. The mineralogy of specimens is not precisely established. Instead, general material kinds are included as descriptors. Several comments are in order. First, no serious effort was made to distinguish what has traditionally been called "fine-grained basalt" from "argillite". Both are dense, finegrained, usually dark grey to black, and appear to have similar flaking characteristics. They are not easily distinguished, and past distinctions among specimens often have proven to be spurious on reexamination by expert mineralogists. The important point seems to be that along the Columbia River, both materials occur in earlier assemblages far more frequently than in later and both appear to support the same kind of lithic technology. What we have called "argillite" probably contains materials others would prefer to call "fine-grained basalt".

Second, it should be noted that mudstone is a fine-grained but moderately dense metamorphosed sedimentary rock. It is usually grey-green and appears to have been almost exclusively involved in some kind of modified Levallois flake-blade technology associated with Vantage Phase assemblages.

Silicified or silicious siltstone is a very hard fine-grained metasedimentary rock distinguished from argillite on the basis of its apparently higher silica content.

Argillite (shale) may be called schist or greenstone by others, but is a very soft tabular material that barely will hold a cutting edge. It appears to have been used in a few instance for casual battering or cutting tools.

2. Projectile Point Classification. To save effort in metrication, all classifiable specimens are photographed. The classification system after Lohse (1985) is described below:

Type	Brief Definition
Windust C	Squat, heavy lanceolates with a deep single notch in the basal margin; basal margins usually edge-ground. Age range is 10,000 to 7,000 years ago.
Cascade A	Broad, often thick unnotched lanceolate points with rounded or pointed bases. No marked constriction appears at the base. Age range is 8000 to 4000 years ago (radiocarbon years).
Cascade C	Slender unnotched lanceolate and a markedly contracting convex base. Age range is 8000 to 4000 years ago.
Mahkin Shouldered	Large, shouldered unnotched lanceolate with a convex blade margin. Time range is 8000 to 3500 years ago.
Cold Springs Side Notched	Large sidenotched with convex blade margin and contracting lateral basal margin. Age range is 7000 to 3500 years ago.
Nespelem Bar	Small, elongate, triangular slightly shouldered without notches. Basal margin convex, stem contracting. Age range is 5000 to 3000 years ago.

Type	Brief Definition
Plateau Side-Notched	Small, side-notched with triangular plan, straight blade margin and expanding or straight lateral basal margin. Age range is 1500 to 150 years ago.

APPENDIX D

ARTIFACT CATALOG

APPENDIX D
Similkameen Multipurpose Project
Cultural Resource Sites
Artifact Catalog

Site	Object Type One	Two	Three	Material Type and Notes
** Site Number				
** Site Number 45-OK-367				
45-OK-367	BRF			Chert
45-OK-367	BRT			Mudstone
45-OK-367	BRT			Mudstone
45-OK-367	COF			Mudstone
45-OK-367	COF			Argillite
45-OK-367	COF			Argillite
45-OK-367	COF			Mudstone
45-OK-367	COF			Argillite
45-OK-367	COR			Mudstone
45-OK-367	COR			Argillite
45-OK-367	DEB			Mudstone
45-OK-367	DEB			Argillite
45-OK-367	FFG			Mudstone
45-OK-367	FFG			Chert
45-OK-367	FFG			Argillite
45-OK-367	HIS			Blue and white porcelain
45-OK-367	HIS			Blue and white porcelain
45-OK-367	PPT			Argillite (projectile point)
45-OK-367	RES			Argillite
45-OK-367	RES			Argillite
45-OK-367	RES			Argillite
45-OK-367	SCR			Jasper
45-OK-367	UTL			Argillite
** Site Number 45-OK-528H				
45-OK-528H	BOT			Lavender glass bottle neck, corked
** Site Number 45-OK-529				
45-OK-529	COF			Argillite
45-OK-529	HAM			Argillite
** Site Number 45-OK-531				
45-OK-531	COF			Chalcedony
45-OK-531	COR			Mudstone
45-OK-531	SCR	SPO	GRA	Argillite
** Site Number 45-OK-532				
45-OK-532	BON			Large Mammal Bone
45-OK-532	BON			Large Mammal Bone

APPENDIX D
Similkameen Multipurpose Project
Cultural Resource Sites
Artifact Catalog

Site	Object Type One	Two	Three	Material Type and Notes
45-OK-542	BRF			Argillite
45-OK-542	COF			Quartzite
45-OK-542	COF			Argillite
45-OK-542	COF			Argillite
45-OK-542	COF			Argillite
45-OK-542	COF			Argillite
45-OK-542	COF			Argillite
45-OK-542	COF			Argillite
45-OK-542	COF			Argillite
45-OK-542	COR			Jasper
45-OK-542	COR			Chert
45-OK-542	DEB			Jasper
45-OK-542	DEB			Opaline
45-OK-542	DEB			Argillite
45-OK-542	FFG			Jasper
45-OK-542	FFG			Argillite
45-OK-542	FFG			Argillite
45-OK-542	FFG			Opaline
** Site Number 45-OK-545				
45-OK-545	BIF			Opaline (rolled)
45-OK-545	BIF			Argillite
45-OK-545	BON			Bone
45-OK-545	BON			Turtle carapace
45-OK-545	BRF			Quartzite (rolled)
45-OK-545	BRF			Quartzite (rolled)
45-OK-545	BRF			Argillite (rolled)
45-OK-545	BRF			Mudstone (rolled)
45-OK-545	BRF			Argillite (rolled)
45-OK-545	COF			Argillite (rolled)
45-OK-545	PPT			Argillite (projectile point base)
45-OK-545	SCR			Argillite (rolled)
45-OK-545	TKN			Argillite
** Site Number 45-OK-547				
45-OK-547	BRF			Argillite
45-OK-547	CHO			Argillite (shale)
45-OK-547	COF			Chalcedony
45-OK-547	COF			Argillite
45-OK-547	COF			Argillite
45-OK-547	COF			Jasper
45-OK-547	COF			Argillite
45-OK-547	DEB			Argillite (shale)

APPENDIX D
Similkameen Multipurpose Project
Cultural Resource Sites
Artifact Catalog

Site	Object Type One	Two	Three	Material Type and Notes
45-OK-532	BRF			Argillite
45-OK-532	COF			Jasper
45-OK-532	FFG			Jasper
45-OK-532	PPT			Argillite
** Site Number 45-OK-534				
45-OK-534	BRF			Jasper
45-OK-534	BRF			Argillite
45-OK-534	BRF			Argillite
45-OK-534	COF			Mudstone
45-OK-534	COF			Argillite
45-OK-534	COF			Argillite
45-OK-534	COF			Argillite
45-OK-534	COR			Argillite
45-OK-534	FFG			Argillite
45-OK-534	FFG			Jasper
45-OK-534	FMR			Sedimentary rock
45-OK-534	FMR			Sedimentary rock
45-OK-534	HIS			12 Ga. Shotgun shell base (Canuck brand)
** Site Number 45-OK-535				
45-OK-535	BRF			Argillite
45-OK-535	CHO	EDG	ANV	Sandstone
45-OK-535	COF			Jasper
45-OK-535	COF			Argillite
45-OK-535	COF			Argillite
45-OK-535	COR			Argillite
45-OK-535	FFG			Argillite
45-OK-535	MIC	UTL		Argillite
45-OK-535	PES			Granodiorite
45-OK-535	PPT			Argillite (projectile point midsection)
** Site Number 45-OK-537				
45-OK-537	BIF			Argillite
45-OK-537	BRF			Argillite
45-OK-537	BRF			Silicious siltstone
45-OK-537	COF			Argillite
45-OK-537	COR	UTL		Argillite
45-OK-537	DEB			Argillite
** Site Number 45-OK-542				
45-OK-542	BIF			Mudstone
45-OK-542	BRF			Opaline

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Site	Object Type One	Two	Three	Material Type and Notes
** Site Number 45-OK-550				
45-OK-550	BLA			Jasper
45-OK-550	BRF			Argillite
45-OK-550	COF			Argillite
45-OK-550	COF			Jasper
45-OK-550	COF			Argillite
45-OK-550	COF			Argillite
45-OK-550	FFG			Jasper
45-OK-550	UTL			Argillite
** Site Number 45-OK-551				
45-OK-551	BON			Burned bone
45-OK-551	COF			Argillite
45-OK-551	COR			Argillite
45-OK-551	DEB			Argillite
45-OK-551	PPT			Argillite (projectile point)
45-OK-551	TKN			Argillite
45-OK-551	UTL			Opaline
** Site Number 45-OK-552				
45-OK-552	BON			Large mammal bone (rib)
45-OK-552	BON			Large mammal bone (rib)
45-OK-552	BON			Large mammal bone
45-OK-552	BRF			Jasper
45-OK-552	COF			Argillite
45-OK-552	COR			Argillite
45-OK-552	HIS			Fused glass
45-OK-552	HIS			White glazed earthenware
45-OK-552	HIS			White glazed earthenware
45-OK-552	HIS			Soup spoon bowl, base metal
** Site Number 45-OK-553				
45-OK-553	BIF			Argillite (shale)
45-OK-553	BON			Burned bone
45-OK-553	COF			Argillite
45-OK-553	COF			Argillite
45-OK-553	COF			Argillite
45-OK-553	UTL			Chalcedony
** Site Number 45-OK-554				
45-OK-554	BRF			Argillite
45-OK-554	BRF			Argillite
45-OK-554	BRF			Argillite
45-OK-554	COF			Argillite
45-OK-554	COF			Argillite

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Site	Object Type One	Two	Three	Material Type and Notes
45-OK-554	FFG			Argillite
45-OK-554	HIS			Fused glass
45-OK-554	HIS			Clear glass fragment
45-OK-554	HIS			White glazed earthenware
45-OK-554	HIS			White/peach porcelain, Occupation Ware
45-OK-554	SCR			Jasper
** Site Number 45-OK-555				
45-OK-555	BON			Fish Bone
45-OK-555	BRF			Argillite
45-OK-555	BRT			Argillite
45-OK-555	COF			Opaline
45-OK-555	COF			Jasper
45-OK-555	COF			Argillite
45-OK-555	COF			Argillite
45-OK-555	COR			Argillite
45-OK-555	COR	SCR		Argillite
45-OK-555	FFG			Jasper
45-OK-555	FFG			Argillite
45-OK-555	FFG	SPO	SPO	Argillite
** Site Number 45-OK-556				
45-OK-556	BON			Mammal bone
45-OK-556	BON			Bone
45-OK-556	BRF			Argillite
45-OK-556	BRT	UTL		Argillite
45-OK-556	TKN			Slate/argillite
45-OK-556	UTL			Jasper
** Site Number 45-OK-557				
45-OK-557	BIF			Shale
45-OK-557	BIF			Quartzite
45-OK-557	BIF			Argillite
45-OK-557	BON			Small Mammal Bone (Rib)
45-OK-557	BON			Burned bone
45-OK-557	BON			Small Mammal Bone
45-OK-557	BRF			Argillite
45-OK-557	BRF			Argillite
45-OK-557	BRF			Chert
45-OK-557	BRF			Argillite
45-OK-557	BRF			Argillite
45-OK-557	BRF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite

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Site	Object Type One	Two	Three	Material Type and Notes
45-OK-557	COF			Argillite
45-OK-557	COF			Chert
45-OK-557	COF			Chalcedony
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Argillite
45-OK-557	COF			Silicified Siltstone
45-OK-557	COR			Mudstone
45-OK-557	COR			Argillite
45-OK-557	DEB			Mudstone
45-OK-557	DEB			Argillite
45-OK-557	FFG			Silicified Siltstone
45-OK-557	FFG			Argillite
45-OK-557	FFG			Argillite
45-OK-557	FFG			Argillite
45-OK-557	FFG			Argillite
45-OK-557	FFG			Argillite
45-OK-557	PPT			Obsidian (projectile point base)
45-OK-557	PPT			Argillite (broken projectile point)
45-OK-557	PPT			Chert (projectile point)
** Site Number 45-OK-558				
45-OK-558	BRF			Argillite
45-OK-558	BRF			Argillite
45-OK-558	BRF			Argillite
45-OK-558	BRF			Argillite
45-OK-558	COF			Mudstone
45-OK-558	COF			Argillite
45-OK-558	COF			Jasper
45-OK-558	COF			Argillite
45-OK-558	COF			Argillite
45-OK-558	COF			Argillite
-OK-558	COR			Silicious mudstone
45-OK-558	COR			Chert or argillite keeled microblade core

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Site	Object Type One	Two	Three	Material Type and Notes
45-OK-558	DEB			Opaline
45-OK-558	DEB			Opaline
45-OK-558	MIC			Argillite
45-OK-558	MIC			Argillite
45-OK-558	PPT			Argillite (projectile point base)
45-OK-558	PPT			Argillite (projectile point)
45-OK-558	RES			Chert
45-OK-558	SHL			Mussel shell
** Site Number 45-OK-559				
45-OK-559	COF			Argillite
45-OK-559	COR			Argillite
45-OK-559	FFG			Argillite
** Site Number 45-OK-560				
45-OK-560	BIF	UTL		Argillite
45-OK-560	BRF			Argillite
45-OK-560	FFG			Argillite
45-OK-560	FFG			Argillite
45-OK-560	FFG			Argillite
** Site Number 45-OK-564				
45-OK-564	COF			Argillite
** Site Number 45-OK-565				
45-OK-565	BRF			Argillite
45-OK-565	COF			Mudstone
45-OK-565	COR			Mudstone
45-OK-565	DEB			Mudstone
45-OK-565	FFG			Argillite
** Site Number 45-OK-566				
45-OK-566	BRF			Mudstone
45-OK-566	BRF			Argillite
45-OK-566	BRF			Argillite
45-OK-566	BRF			Argillite
45-OK-566	BRF			Argillite
45-OK-566	COF			Mudstone
45-OK-566	COF			Argillite
45-OK-566	COF			Argillite
45-OK-566	COF			Argillite
45-OK-566	COF			Argillite
45-OK-566	COF			Argillite
45-OK-566	COF			Argillite

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	Object Type			
Site	One	Two	Three	Material Type and Notes
45-OK-566	COF			Argillite
45-OK-566	COF			Obsidian
45-OK-566	COF			Argillite
45-OK-566	COF			Argillite
45-OK-566	COF			Argillite
45-OK-566	COR			Mudstone
45-OK-566	COR			Mudstone
45-OK-566	DEB			Mudstone
45-OK-566	DEB			Argillite
45-OK-566	DEB			Argillite
45-OK-566	DRI			Argillite
45-OK-566	FFG			Argillite
45-OK-566	FFG			Obsidian
45-OK-566	FFG			Argillite
45-OK-566	FFG			Argillite
45-OK-566	MIC			Chert
45-OK-566	SPO			Argillite

APPENDIX E

SITE FORMS

Deleted for Public Distribution